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PYELOSCOPY

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PYELOSCOPY is but a preliminary to pyelography, but adds, we believe, distinctly to the comfort of the patient, as well as the safety, and to the accuracy of the entire procedure.

When one reads that most excellent book on pyelography, by Braasch, he is first impressed with the fact that the author is an artist and a genius; and then he awakes to the realization that for a few dollars he has procured a monumental wealth of information and illustration. One also receives a less comforting impression, viz., that the interpretation of the pyelogram is indeed a difficult and intricate matter.

Happily, the roentgenologist is not concerned with the tedious clinical and cystoscopic studies necessary to the proper selection of cases for pyelographic study. He needs but observe the frequent difficulty with which the cystoscopist succeeds in passing the catheters, and the suffering on the part of the patient, to realize that he has by far the easier, though no less important, part of the task; for if the roentgen ray technique is at fault, then all other effort and suffering have been for naught.

Ideal conditions for such studies are rare even in our largest hospitals; that is, the cystoscopic room is at some distance from the roentgen ray room, so that the cystoscopic table can rarely be used as the radiographic table. On the other hand, the radiographic table is not at all adapted to cystoscopy, consequently the patient has to be taken from one room to another with the catheters *in situ*. We believe that the greatest disadvantage in this arrangement occurs when the catheter cannot be inserted more than a few centimeters into the ureter, for then to remove the cystoscope means almost inevitably that the catheter will also be removed from the ureter, while moving the patient with the cystoscope inserted causes continued discomfort and does not insure the retention of the catheter in the ureter in all instances. The removal of the patient from one room to another with the catheter alone inserted adds very little to his troubles. It is common practice to do this in making certain kidney function tests. To make this change with the cystoscope inserted and carefully held is almost inconsiderable as compared to the discomfort of the previous manipulation.

Since we are not, as a rule, fortunately located with special cystoscopic table and roentgen ray apparatus in the same room, let us consider to what extent we can

approach the ideal by moving the patient, after catheterization, to the roentgen ray laboratory. It is essential, for the present purpose, to assume that in any hospital where pyelography is a practicable procedure, pyeloscopy also is possible, or at any rate, should be.

FIG. 1.

The horizontal fluoroscope is the place, then, to which the patient is taken from the cystoscopic room. This apparatus must be equipped with a roentgen ray tube which will permit of more or less rapid change of resistance to the high tension current and will withstand heavy discharge currents, such as the Coolidge tube, or the air-cooled hydrogen regulating tube. The latter is the tube which was used in our earlier studies, but more recently a moderately fine focus Coolidge tube has replaced this. The fluorescent screen should be very sensitive and free from lag. In short, it is the sort of combination with which we are making fluoroscopic and radiographic examinations of the gastro-intestinal tract. We do not resort to ordinary illumination of the screen with from one to three milliamperes of current at six or seven inch tube resistance, but instead use from ten to twenty, or even thirty, milliamperes with the tube resistance at from three to four inch spark gap resistance. It is by no means necessary to have the screen constantly illuminated in this manner for one to have perfect control of the process. Then, too, the eye is more sensitive to delicate shadows if the screen is alternately light and dark. The patient gets far less exposure than is given the average gastro-intestinal case, and because of the fact that there is less scattered radiation from rays of low than from those of high penetration, the operator is not assuming any unusual risk.

The tube control must be such that one can change promptly from fluoroscopic to roentgenographic adjustment, since much of the differential information is obtained in the roentgenographic records of various degrees of distention, amd these change more or less rapidly up to the point of complete distention. Our rheostat, controlling the filament current, is mounted on a brace attached to the side of the tube box, so that it is immediately accessible. The high tension current is under control by means of a foot-switch with three points of contact, each point having a definite value with relation to the rheostat of the main transformer. The roentgenogram is made with the aid of the intensifying screen and therefore requires but short exposure. The loaded cassette is placed on the abdomen and held in position by the weight of the fluorescent screen. For pyeloscopy then, we use a modern fluoroscopic table and modern tube outfit. Opaque catheters should be used, but are not essential. The opaque fluid should be injected by gravity at as slow pressure as possible. But, regardless of the kind of catheter used or the method of injection, one meets with all sorts of perversities which lead to disappointment when not checked up by means of the fluoroscope.

When the catheter is opaque, it is very clearly seen on the screen, revealing at

once the line of the ureter and the extent to which the catheter is inserted. After the injection of from one to two c.c. of the opaque solution, one sees the relation of the catheter end to the pelvis or calyces and can withdraw it to the desired point the solution being temporarily stopped. If the pelvic shadow appears normal on the screen the process is discontinued; but if doubt exists, the injection may be continued cautiously until some definite shape appears, or the size of the shapeless shadow

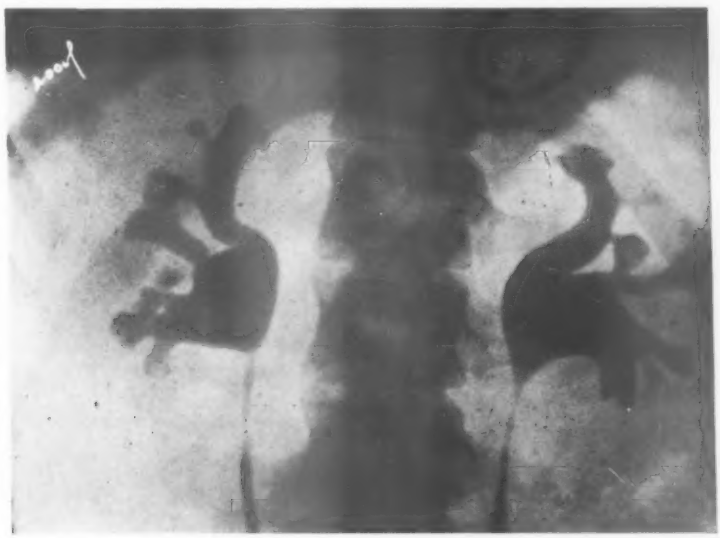

FIG. 2.

if it is inserted too far. The tip of the catheter should not be higher than the ureteropelvic junction, for the kidney moves downward perceptibly in many cases during inspiration or straining, while the catheter remains more or less stationary, and thus the pelvic lining may be injured. Occasionally the solution does not flow until after the catheter has been withdrawn slightly. The transparent catheter does not of itself cast a shadow but can be seen when its lumen is filled with the opaque solution.

Once the pelvis is located the tube containing the solution can be lowered so that there will be a very slow-filling process, which causes much less pain than a rapid filling with the same degree of distention. As soon as the pelvic shadow assumes shape, an intensifying screen with plate is placed under the fluorescent screen and an instantaneous exposure made through a small diaphragm opening, the flow of becomes so large as to indicate gross pathology, and then another exposure is made. The normal kidney pelvis is readily recognized before it becomes over-distended. One must always respect the patient's sensations, but it frequently happens that pain will be complained of when the pelvis is not distended. On the other hand, we have slides to show that in one case the opaque solution passed into the tubules of the kidney to a great extent without the patient having complained of pain. In this instance, however, the fluorescent screen was not used. Serious damage might have been caused by this over-distention. (Fig. 1.)

The solution sometimes regurgitates so rapidly along the catheter that alarming amounts are necessary to distend the pelvis. This, too, one can recognize on the screen, and adjust the flow to compensate. When both kidneys are being injected it is very important that the filling process

FIG. 3.

of the two sides be controlled independently, the flow being checked in one while it is progressing less rapidly in the other, or while some difficulty is being overcome. When there is no contraindication to immediate removal of the catheter, the catheter may be gradually withdrawn so that the ureter may be distended throughout its length. (Fig. 2.)

When a stone shadow is clearly seen on the roentgenogram, is found to be in the kidney area, is associated with renal colic, or with pain and blood in the urine, and further, if the stone shadow be of irregular outline conforming to the shape of some portion of the kidney pelvis or calyx, then the diagnosis is reasonably positive as to the presence of stone in some portion of the kidney. But this is by no means as complete a diagnosis as is possible, unless the stones be of such size or number as to demand the removal of the entire kidney without question. (Fig. 3.)

It is seldom that the entire outline of the kidney is shown on the roentgenogram. The lower pole, however, frequently casts a distinguishable shadow, so that the kidney area is not always clearly defined, especially on the right side. Occasionally a kidney stone may be round or nearly so, and also occasionally a single gall-stone, which is usually round, may be phosphatic and therefore cast a dense shadow. In the case shown in Fig. 4, the symptoms and signs, even to the presence of albumen and blood in the urine, were referable to the right kidney. The surgeon was so impressed with the clinical picture, and was so lacking in confidence in our opinion that the stone was too high for the kidney and was in the gall-bladder, that he operated for the removal of a kidney stone. Having exposed the kidney, thoroughly explored it and failed to find the stone, he made a small incision in the peritoneum posteriorly, palpated the gall-bladder, felt the stone and then removed it through an incision anteriorly, after closing the wound on the back. Neither pyeloscopy nor pyelography were practiced in this case; or in other words, the differential diagnosis was incomplete.

Then, there are many cases in which the clinical diagnosis is of a positive character but the roentgenogram fails to reveal

FIG. 4.

a stone shadow in any portion of the urinary tract. In some of these the symptoms due to the passage of minute particles of sand enmeshed with cell detritus, leukocytes, red blood cells, etc., making a mass of sufficient size and firmness to actually block and scratch the ureter. When such a mass reaches the bladder it will readily pass through the urethra and be called a stone or fragment of a stone. If this is allowed to become dry, it will retain its shape, have a rough, gritty and pitted surface, but a very low specific gravity. When first passed, and before it becomes dry, such a mass may be spread out between the thumb and forefinger, and the sense of touch may reveal roughness due to minute calcareous particles. The roentgenogram will not record such a foreign body, and in fact, neither pyeloscopy nor pyelography will be of assistance unless the ureter be completely blocked, or the kidney pelvis be dilated from repeated attacks of ureteral obstruction.

Fig. 5 shows the presence of three small dense shadows falling within the outline of the lower pole of the right kidney. These shadows have been cast by three calculi in the kidney, as proven finally by operation. But, in what portion of the kidney are they? They are small and might be difficult to find. To what extent must the kidney be damaged in their removal? This depends on their location and the necessary route of operation. The kidney outline is of abnormal size. Does this indicate an otherwise diseased kidney demanding nephrectomy? These are the questions in this case to be answered by pyeloscopy and pyelography.

Fig. 5.

Fig. 6.

Fig. 6 shows an opaque ureteral catheter projecting far above the level of the stone shadows, so far that one would suspect it of being at the apex of the upper calyx. This is the first important observation on the fluoroscope. The catheter seems to be high enough to injure the kidney, if the patient should take a long breath; for the catheter does not move up and down

FIG. 7.

with the kidney during respiration, and the tip of the catheter is not very soft. Both the outline of this kidney and the stones could be clearly seen on the fluoroscope. Before any opaque solution was injected the cystoscopist was asked to withdraw the catheter until its tip was seen to be at or near the ureteropelvic junction. Then with a small amount of the solution injected it was found that the outline of the stone shadows became obscured, and, further, that new shadows appeared to a considerable distance above the stones. It was also noted that the stone shadows moved with the opaque fluid shadow during respiration. Fig. 7 was made at this point. The detail apparent here indicates that a small amount of the opaque solution not only surrounds the stones but that there is a more delicate line of shadow connecting these, permitting the conclusion that the stones are in the lower calyx. The ureter seemed to continue upward from the tip of the catheter without indicating the presence of a true pelvis, but upon resuming the injection we found that the ureter bifurcated and that there were really two pelves. Fig. 8 was made at this point and demonstrates the further very important fact that, except for the presence of the three stones, the pelves and calyces are entirely normal. We now have, in addition to the positive diagnosis, the exact location, definite indication for surgical procedure, an explanation of the abnormal size, and a favorable prognosis.

Fig. 9 represents an unusual point in differential diagnosis—a mass presented in the right upper abdomen. It had about the size, shape and firmness of a kidney. Many of the symptoms were related to the kidney, especially pain and tenderness in the loin. With one hand on the abdomen and the other on the back the mass could be felt by both hands and it was rather freely movable. A definite shadow ap-

FIG. 8.

peared on the roentgenogram, with a shape similar to that of the lower pole of a kidney, but perhaps more dense. During the pyeloscopic examination the mass could be felt and its shadow could be seen on the screen, so that with an opaque solution in the renal pelvis visualizing the kidney it was possible to observe the mobility of the mass in question and also that of the kidney pelvis. The kidney could not be dis-

FIG. 9.

placed by palpation, whereas the mass could be moved more or less freely. It was clearly on a plane anterior to that of the kidney; also it moved toward the median line to such an extent that the outermost point of the kidney calyces appeared beyond the mass. The last mentioned observation is clearly demonstrated. At operation a pendulous and greatly distended gall-bladder was found.

This briefly is the course pursued in every case that is suitable for pyelographic study. The procedure is especially interest-

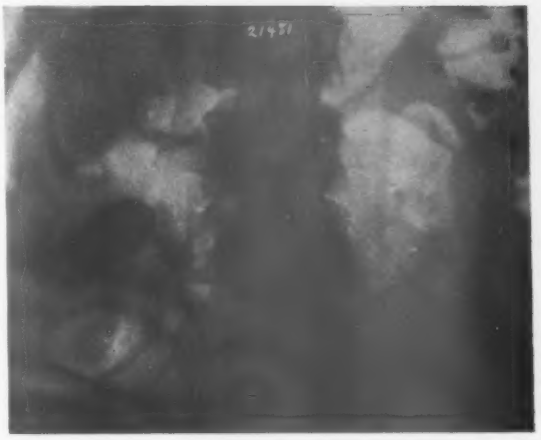

FIG. 10.

ing in studying the pelvic condition of movable kidney, for one can observe not only the extent of motion but the manner of it as well. It is entirely practicable to manipulate the kidney much as one manipulates the stomach or colon under fluoro-

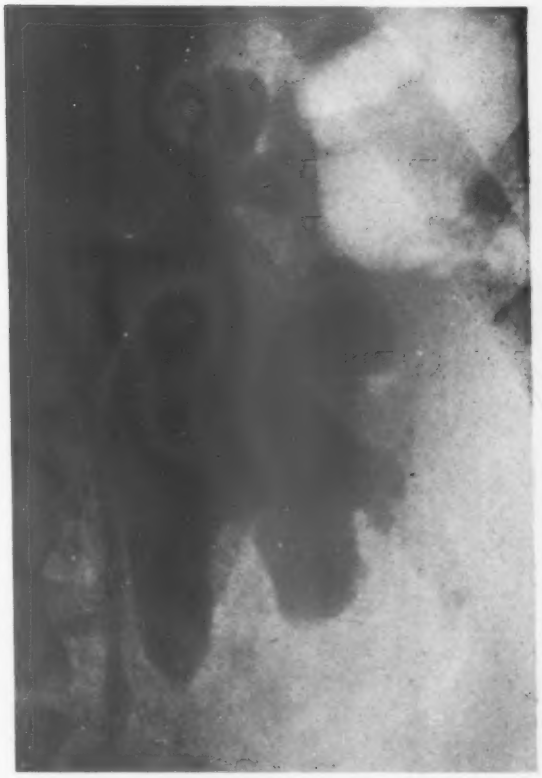

FIG. 11.

FIG. 12.

FIG. 14.

FIG. 13.

FIG. 15.

scopic observation. In this way it is possible to determine whether or not the kidney rotates and the extent and manner of its rotation. Fig. 10 shows a rotated kidney. Figs. 11 and 12 demonstrate two positions of a hydronephrotic kidney with a duplicated pelvis.

When the kidney pelvis is partly destroyed by infection it is important to avoid complete filling for obvious reasons. With the aid of the fluoroscope one is able to control the degree of distention, when it is clear that the pelvis and calyces are not normal in shape or size. This is particularly true in the case of pyonephrosis. Fig. 13 is of a pyonephrotic kidney. Note incomplete filling of cavity in the upper pole of the kidney.

Figs. 14 and 15 illustrate two stages in the injection of a pyonephrotic kidney having two stones in the pelvis. The pus cavities are incompletely distended with thorium solution.

Pyeloscopy is not entirely satisfactory if the patient is very stout, but even then it serves to control the position of the catheter when it is opaque to the rays, and to show whether the solution is actually going into the kidney pelvis or regurgitating into the bladder.

The roentgenographic record is, of course, more valuable in determining the finer points of pelvic diagnosis, and when made after the above-described technique is quite as reliable as when it is made with the plate on the back after the usual manner.

Since by means of the fluoroscope one has control of pelvic over-distention there is no reason why the whole operation should not be performed under general anæsthesia.

THE MEDICOLEGAL STATUS OF THE ROENTGENOLOGIST*

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ONE of the most annoying and at the same time important situations confronting the roentgenologist today is the constantly increasing demand made upon him to attend court. You all know that it is no uncommon occurrence to have thrust upon us three or four legal summons during the week to appear at court and testify as to certain injuries, or to verify the authenticity of our plates. Our present laws are so enacted that any legal luminary can, over the most trifling conceivable case, compel us to attend court by the hour or day usually at the munificent fee of $2.00. It matters little to the average lawyer handling such a case whether you are losing $100.00 or more per day, whether you are interrupted in the pursuit of your studies, or are intercepted in the supervision of a vital case which needs your immediate and personal attention.

Only last week no less than three subpœnas were served upon me in one day, two in person, and one with a check for $2.00 attached, handed in to the office attendant in the reception room. Had the attorney who prepared the summons in this latter instance been considerate enough to acquaint me with the status of the case, much annoyance and ill feeling would easily have been spared. As it was, this particular case had been roentgenographed by an assistant at the bedside with portable apparatus. This assistant had in the interval gone east and joined the army. The trial was set for ten o'clock in the Superior

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Court in the morning following the summons. Prior to this hour, I made many efforts to get into communication with the attorney, but was unable to locate him. It therefore became necesssary for me to appear in court at the stated hour in order to escape being fined for contempt. On this particular day, I was engaged in making serial examinations upon two gastro-intestinal cases. One of these patients, quite ill, had been sent in from a distant city, and had been prepared for examination at the hour I was due in court. As this was an individual who could not well be passed to an assistant for diagnosis, I was compelled to keep him over another day in order to make a proper study of his condition. This was not only detrimental to the patient's comfort, but added materially to his expense, and as acute obstruction was found to exist, postponed by twenty-four hours a necessary operation, the delay of which might at any moment have cost the patient his life. To make matters more exasperating, upon arrival at court on the morning in question, the elusive lawyer greeted me with a smile and calmly informed me that the case had been adjourned until the following morning.

I have taken the liberty to cite this extreme case at length to illustrate one of the many unreasonable situations which we as roentgenologists have to endure. I do not mean to infer that all attorneys are as thoughtless or illogical as one might surmise from the example related. I have many friends among our leading judiciary, and am usually treated with both courtesy and consideration.

The large majority of court cases for which we are subpœnaed are the damage suits instituted and founded largely upon the roentgen appearance of certain fractures, dislocations, and injuries to bones and joints. These are the numerous petty and pesky cases wherein you have seen the patient once only for a roentgen examination. It is usually an epoch of the past, and you have forgotten all the circumstances. The event is suddenly called to mind by a subpœna accompanied by $2.00 cash for your appearance in court. You are assured that it is merely for the purpose of identifying your plates, that it will take only five minutes of your time, and that your testimony will be very much appreciated, and so forth. If this was all true, we could perhaps forgive many lawyers and support them in their stern efforts to separate from the soulless corporation, insurance company, or luckless individual a certain amount of filthy lucre to be cleverly divided between themselves and their clients. Unfortunately, however, when they get you on the stand, the five minutes are usually transformed into hours, and not only are you asked to give expert testimony for the original $2.00, but very frequently the lawyer expects to win his case entirely upon your evidence. Under these circumstances, a reasonable fee commensurate with the value of your evidence is not only proper, but its demand should be recognized legally. Even the occasional fee of $25.00 or $50.00 for one appearance does not as a rule intrinsically recompense one for time lost from routine work or private practice. Many of the Superior Court judges in our own city recognize the importance of competent roentgenologic interpretation in the trials and show a disposition to encourage our efforts. In only one instance, and that was quite recent, did a Superior Court judge refuse to allow me to interpret one of my own plates, which had already been admitted as evidence in his court. I mention this in passing as it is the only time during fifteen years of more or less court experience that any such autocratic discourtesy has been shown me.

In regard to the legal status of the roentgen plate, I believe that this belongs primarily to the roentgenologist, that the latter is obliged, if requested, to furnish a print, a copy, or a written report. If an opinion is desired as to prognosis or treatment, then, in my opinion, the roentgenologist becomes a consultant and is privileged to exact a professional charge consistent with the exigencies of the case in hand.

The power to administer justice vested in our judiciary by the people and for the benefit of the people miscarries when it causes, as in many of these suits, a greater loss of time or money than the damage claimed. This is lack of vision on the part of the law. The purpose of this plea is to seek a remedy, and I trust that at this meeting a sufficient impression will be made upon our members so that proper steps may be taken to modify these unjust medicolegal demands.

OPAQUE ROENTGEN RAY MEALS AND ENEMAS

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OPAQUE ROENTGEN RAY MEALS

THE USE of the bismuth salts in the food to outline the various viscera dates from the experiments of Cannon (6) at Harvard in 1896. His aim, when beginning the experiments, was to establish the fact that the esophagus had peristaltic movements. In these experiments he fed bismuth-filled capsules to a goose and later fed cats on bismuth-impregnated meat and bread and milk. In 1899 Williams and Cannon in America gave large doses of bismuth subnitrate with food to human beings and made screen observations and plates of the alimentary tract. Five years later Rieder published his famous paper. Bismuth subnitrate was used for this work, but on account of its toxicity by deterioration in the gastro-intestinal tract, it has been almost wholly superseded by the subcarbonate and oxychlorid of bismuth and barium sulphate. Of these, barium sulphate is now the salt almost exclusively used on account of its cheapness.

Bismuth subcarbonate, the second salt to be used, is good but expensive. Jordan (2) advocates this salt, claiming that it (1) neutralizes any hyperacidity, thus decreasing pylorospasm and allowing better filling of the duodenal cap, and (2) does not decrease peristalsis. His meal is bismuth subcarbonate 4 oz., sugar of milk ½ oz. and enough water to make an emulsion that is not too thick—the whole being less than a tumblerful. He uses slightly larger amounts in proportion to the size of the patients. The values he attributes to the sugar of milk are: (1) it assists in making a satisfactory emulsion; (2) it increases the bulk of the meal; (3) it makes the meal pleasant and (4) is slightly laxative, thus overcoming the constipating effect of the bismuth and preventing caking in the colon. This bismuth subcarbonate mixture is expelled from the stomach more rapidly than the oxychlorid and barium sulphate mixtures, hence a six-hour residue means considerable delay at the pylorus. Jordan believes that the six-hour residue has no diagnostic significance, hence he feels that this is no drawback to his meal.

Bismuth oxychlorid is lighter than the subcarbonate, hence more easily held in suspension; it is not alkaline, hence does not interfere with peristalsis.

Barium sulphate is the salt most universally used in this country. Its greatest advantage is its cheapness. It must be used in slightly larger amounts than either of the preceding salts. One must be sure that the barium supplied is that prepared especially for roentgen ray work, as the commercial variety may contain soluble barium salts which are toxic. In this paper, wherever a formula is given for a bismuth meal, barium sulphate may be substituted by increasing the amount of barium about one fourth.

The menstruums used for carrying the bismuth or barium are many and varied, each author using from one to three, but

each recommending his particular pet. A few of them are: farina porridge; cream of wheat; wheat hearts; corn meal mush; bread and milk; cornstarch pap; mashed potatoes; mucilage of acacia; malted milk; buttermilk; fermented or clotted milk, known under various trade names as kefir, lactose, yogurt, fermolac, brolactly, koumiss; sweet milk; sugar of milk emulsions; potato-starch pap: spinach; rice; meat; chicken soup; and so forth.

Carman (7) gives the following requirements for a good barium meal. It should be (1) more or less palatable; (2) thick enough to hold the salts in suspension; (3) thin enough to fill all recesses; (4) not stimulative of gastric secretion; (6) not productive of early pyloric closure; (7) not lumpy, that is, an even smooth emulsion; (8) of definite composition; and (9) easily and quickly prepared.

The meals of gruel, cream of wheat and such, when mixed with the bismuth or barium, are often too gritty and are very flat. They are usually flavored with some fruit syrup or milk (not cream, as the fat here inhibits digestion and lengthens the emptying time) and sugar. Jordan's sugar of milk emulsion is said to be very palatable. The various starch mixtures are fairly good, as the boiling they receive usually converts part of the starch to sugar. The acacia mixtures usually require some flavoring. The fermented and buttermilk mixtures are very good. Pfahler (9) of Philadelphia in 1906 made tests with milk, mucilage of acacia, pure and dilute, and kefir. A definite amount of bismuth was placed in each of four test tubes, the tubes filled with the above mixtures and the whole thoroughly shaken. In one hour the bismuth had sedimented completely in the milk and diluted mucilage of acacia, and had nearly sedimented in the pure mucilage but was well suspended in the kefir mixture sixteen hours later. Satterlee and Le Wald (1) repeated and confirmed Pfahler's experiments finding, however, that the second best menstruum was thick chicken soup.

These experiments proved conclusively that fermented milk was by far the best medium for holding the opaque salt in suspension. It conforms to all of Carman's requirements and is the one most used in the United States to-day.

It seems that every man has his pet meal and his own method of preparing and giving the same. I will here give you a few of the formulæ, as some of them may have to be substituted for the usual meal. Let me here warn you not to expect the same results as some other man, unless you follow his technique exactly.

George (24) gives the following as the original and standard Reider meal: 40 gms. of bismuth subnitrate, or subcarbonate, in 300 c.c. of cooked gruel. Carman gives the following directions for preparing the cornstarch pap. Nine ounces of cornstarch dissolved in 14 ounces of cold water is poured into 6 quarts of boiling water. Forty-five ounces of barium sulphate is stirred into a thin paste with 20 ounces of hot water, allowed to boil for three or four minutes, and is then added to the starch pap. The whole mixture is stirred well and allowed to boil for five minutes slowly. After cooling, one-half ounce of vanilla extract is added. Syrup of raspberry in larger quantity, or other flavoring, can be used as desired. The mixture will keep well on ice for two or three days. On standing a scum may collect and this must be removed. The customary portion for each patient is twelve ounces of the mixture, which contains about three ounces of barium.

Potato-starch pap is prepared in much the same way. The following is given as a good palatable meal: barium sulphate 3 to 5 oz., agar-agar 1 to 2 oz., sugar ½ oz., cocoa 1 oz., water 17 oz., all to be boiled up together. Cream of wheat, wheat hearts, etc., are prepared by cooking until a rather thick paste results. The barium or bismuth is added after cooking. The fermented milk can usually be purchased already prepared or can be made by adding the lactic acid bacilli tablets to whole milk. Ordinary

buttermilk is often used, but care must be taken that there are no chunks of butter in it as they will interfere with the proper emptying of the stomach. The main objection to ordinary buttermilk is that too much of the fat has been removed, hence it does not hold the barium in suspension as well as the fermented milk.

Most of the American roentgenologists use the six hour or double meal as outlined by Haudek. This is carried out by giving a barium meal in the morning and examining the patient six hours later to determine the amount of residue left in the stomach. The second meal given six hours after the preliminary meal is usually divided into two or three glasses. The first contains 4 to 6 oz. of water with ½ to 2 oz. of barium. This passes through the pylorus easily and quickly fills the duodenum. It also quickly outlines the gastric contour showing all irregularities, as it will run into the various pockets very easily. The next two glasses, containing each 8 oz. of fermented milk, potato pap and so forth, with from 1 to 3 oz. of barium to the glass, are given quickly to completely fill the stomach and allow of a more accurate study of its size, location, irregularities, peristalsis, and so forth. Case (8) recommends giving the barium during the regular breakfast as this will give a better idea of the retention with the usual food, but most men use some regular mixture for this preliminary meal. Case advises that if a special meal is to be used, farina mush gives a more accurate idea of the retention than do the more liquid meals. Jordan (4) advises doubling the amount of bismuth if it is desirable to study the terminal ileum and, in cases of duodenal obstruction, thickening the emulsion with corn meal.

Various unique methods have been advanced for special purposes and while of no great value are of interest as showing the inventiveness of some roentgenologists. I will outline two of them. Swartz's capsules as described by Pfahler (9) are made of goldbeater's skin and contain bismuth and pepsin. These are placed in various solutions of hydrochloric acid and then in the incubator. The length of time required to digest the membrane and release the bismuth is noted. He then has the patient swallow similar capsules and notes, in front of the fluoroscope, the length of time required to release the bismuth in the stomach. By this method he determines the amount of HCl in the stomach. Carman describes Kaestle's capsules which are of two kinds — sinking and swimming — both being filled with bismuth. By the use of these he can show the point of the lower border of the stomach and also the amount of retained secretion or, if the patient is allowed to chew but not swallow appetizing food, they will show the amount of secretion poured out. Another value is that they will show the amount of non-opaque fluid in the stomach above the level of the opaque meal, that is, how much of the magenblase is fluid and how much air.

There is quite a divergence of opinion as to the preliminary preparation of the patient. Many men recommend preliminary catharsis with no breakfast. Others, and I believe the majority, advise no preparation at all except the omission of breakfast on the morning of the examination. Smithies (21) goes much too far in his preparation it seems to me. He washes the stomach and gives a purgative the day before the examination and then keeps his patient on a liquid diet for from eight to twelve hours. Purgatives and stomach washings always disarrange the usual functional activities, whether they be normal or pathological, and cause the patient annoyance. They always make the patient more or less nervous, and may give false findings.

The use of drugs during the examination is sometimes indicated, especially if there is an incisura in the stomach. Some antispasmodic can be given and, if the phenomenon is due to a reflex, it will disappear, but if due to ulcer, it will be unaffected. Belladonna is the drug most used. The tincture may be given to tolerance

and then the examination repeated, or the patient may be given one one-hundredth grain of atropine hypodermatically at the time of the examination.

It will be found for practical purposes that the amount of barium in the opaque meals will have to vary with the size of the individual to be examined. For instance, it would be foolish to give the same amount of barium to a child as to an adult. Also, smaller amounts are required for thin persons than for those with large fat abdomens. After a time you will size up the patient quickly, and will be able to judge the amount necessary to give a good working shadow. For the adult, you will have a standard formula and will increase or decrease this as the patient varies from the average. The usual proportion is three heaping tablespoonsful of barium to the pint of fermented milk or buttermilk and you will add or subtract, depending on the size and build of the patient.

Now, just a few points of warning: (1) Always see that you have a smooth even mixture free from lump; (2) gauge the opaque salt by the size of the abdomen of the individual to be examined; (3) have your patients drink the mixture rapidly, as in taking it in sips, they are liable to carry down air, and you will have what looks like a small stomach, or a very large magenblase; (4) remember, to increase the amount of barium in a mixture, if you are making it according to a formula which calls for bismuth.

Esophageal Examination

The same problems had to be solved in finding the opaque media which would outline the esophagus, as in the case of the stomach, with the additional difficulty that food was rapidly emptied from this organ into the stomach.

From the historical viewpoint, the esophagus is the first of the organs to be studied during life by means of opaque salts given to the living animal. The study of the peristalsis of the esophagus was what started Cannon on his investigation, and the study of the bismuth-filled stomach came as a later and secondary subject.

Many methods have been used to determine the size, peristalsis and patency of the esophagus. The giving of bismuth-filled capsules, or wafers, is recommended by Lange (12) and Pfahler (9), but the consensus of opinion is that they act as foreign bodies and may cause cardiospasm, or remain in the healthy normal esophagus for many minutes. The capsule method of examination has hence fallen into disrepute.

A unique method of getting the esophagus on roentgenograms has been marked out by Bassler (22) and is also described by Niles (18). He uses a four-foot length of 4 mm. rubber tubing, to which is attached a small silk covered rubber bag, which has at its lower end a brass tip. In the upper part of the tube is a stopcock. The patient swallows the bag and tube until the bag is in the stomach. The bag is then filled with water and the stopcock turned off. The bag is now pulled firmly into the cardiac end of the stomach, thus closing the cardia completely. Now, with a catheter passed into the pharynx, or the esophagus, a mixture of barium, acacia, and water is poured into the esophagus until the barium mixture runs out of the patient's mouth. Pictures are then taken and the stopcock opened, allowing the tube to empty and the barium to run into the stomach.

Various media, similar to those used in the examination of the stomach, have been used in this work, as bread and milk, kumis, starch pap, corn meal, apple sauce, cream of wheat, potatoes, etc. Dr. Rush, a recent graduate of this school, following Prince, I believe, recommends grated pineapple as a menstruum, as it makes a thick paste and is agreeable to the patient.

The meal for an esophageal examination most used today is that outlined by Hirsh (20) and recommended by Plummer (17) as holding the barium in good suspension, adhering well to the esophageal wall, being easily washed out and quickly and easily prepared. Hirsh's original formula was a

heaping tablespoonful of bismuth subnitrate, or subcarbonate, to one teaspoonful of mucilage of acacia, stirred for about ten minutes, until a syrupy fluid results. Carman (19) uses four parts of barium sulphate to one of freshly prepared mucilage of acacia instead of the bismuth mixture. When made properly, it is about the consistency of cold molasses, and must be fed to the patient from a spoon. This mixture will adhere closely to the whole esophageal wall, but will outline any irregularity in the wall especially well, as the normal mucous membrane quickly throws it off, leaving the ulcerations standing out in clear relief. This meal should be taken in small amounts, at frequent intervals, as this method gives the best idea of function.

In order to obtain the best view of the cardiac portion of the esophagus, the stomach should be distended with gas, thus raising the left lobe of the liver out of the way.

If a diverticulum is shown by the acacia meal, the pocket or pouch is best filled by using some one of the stomach test meals, as they are more quickly and easily taken.

OPAQUE ENEMAS

The treatment of the bowel, preparatory to giving the opaque enema, still varies considerably. Many men give a thorough purgation the night before the examination, with enemas on the morning of the examination. Others condemn any form of preparation, claiming that it will interfere with the usual function and relations of the colon, and that it really increases, rather than diminishes, the amount of gas in the colon. Violent purgation always leaves the musculature of the colon more or less weakened, which fact makes it impossible to study the deviations from the normal as they occurred before the medication. Personally, I have followed Case's (8) technique. He advises no laxatives, but, at least two hours before the examination, three small enemas of warm salt solution are given at fifteen minute intervals. These cleanse the bowel as well as high enemas could, and if any of the salt solution is left in the colon, it will be absorbed by the time of the examination.

Carman outlines the following requirements of any opaque enema: It shall be (1) non-irritating to the bowels, (2) large enough to fill the whole colon, (3) thick enough to hold the barium in suspension and (4) thin enough to fill all recesses.

As many or more formulæ for opaque enemas are in existence as for opaque meals, but the three which seem to me to be the best are, (1) barium sulphate 3 oz., alcohol 2 drams, gum tragacanth 140 grains, water 2 pints (Case's Formula); (2) six oz. of barium sulphate in one pint of acacia, and three pints of condensed milk; (3) three oz. of barium sulphate in two pints of buttermilk. Also the residue from the opaque meals may be saved, kept on ice and used for the opaque enema.

The mixture should be as warm as body temperature, or slightly above, and should be given by gravity. It is best to have a bulb in the enema tube so that the lumps may be forced through the tip, and also to aid in forcing the enema past some obstruction. Endeavor not to have lumps in the mixture.

It is not necessary to use a colon tube, as a short flaring hard rubber tip reaching just past the internal sphincter will do the same work. Do not be in too big a hurry for the colon to fill; remember you are working against peristalsis. The knee-chest and other grotesque positions are unnecessary, the ordinary position being the best and most comfortable.

Preparation and Use of Bismuth Paste.—Beck's Bismuth Paste, composed of bismuth subnitrate one part and yellow vaseline two parts, should be heated until liquid. While hot it should be thoroughly stirred to mix the bismuth, drawn into a long glass-tipped syringe and injected as hot as possible. After the withdrawal of the syringe a pad should be placed over the opening of the sinus and an ice bag laid on the pad. This hastens the hardening of the

paste and less of it is lost. Should any toxic symptoms result, flush the sinus several times with warm olive oil.

(PRINTED DIRECTIONS GIVEN TO PATIENTS BY DR. CASE.)

No. 1. Take no laxatives or enemas (except by special instructions) for at least 24 hours before the barium meal, nor at any time while the observations are in progress.

No. 2. Do not take any food, drink or medicine on the morning of the examination before the barium meal has been given in the roentgen ray room.

No. 3. Avoid eating or drinking (except perhaps as small an amount of water as may be necessary to allay thirst) after the barium meal, until the stomach has expelled the same. This usually occurs by noon, but exact information will be given in each case.

No. 4. Do not take any laxatives, enemas or bowel treatments (except by special arrangement) during the first two days of the barium test.

No. 5. Women patients will save inconvenience by wearing kimonos.

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ROENTGENOLOGICAL EXAMINATION OF THE MEDIASTINUM*

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IN presenting this paper it is my desire to discuss briefly some of the conditions one is apt to find in roentgenological examinations of the mediastinum.

As all the viscera within the thoracic cavity, with the exception of the lungs and pleuræ, are contained within this comparatively small and inaccessible space, a great variety of conditions may arise which are often exceedingly difficult to diagnose.

A thorough knowledge of the anatomy of this region is, of course, of first importance. The short broad chest with the high diaphragm and transverse type of heart of the stout individual, is entirely different from the long narrow chest with the pendulous heart of the thin person; yet both may be perfectly normal chests. It is only by a careful study of the various types that we can correctly differentiate the normal from the abnormal. Most roentgenologists have neither the time nor the opportunity to study the clinical side of the various cases, and their reports are based solely upon the variations from the normal shadows produced upon the fluoroscopic screen and the roentgen ray negative. A thorough understanding of the gross pathology and general characteristics of the various conditions that may involve these parts will materi-

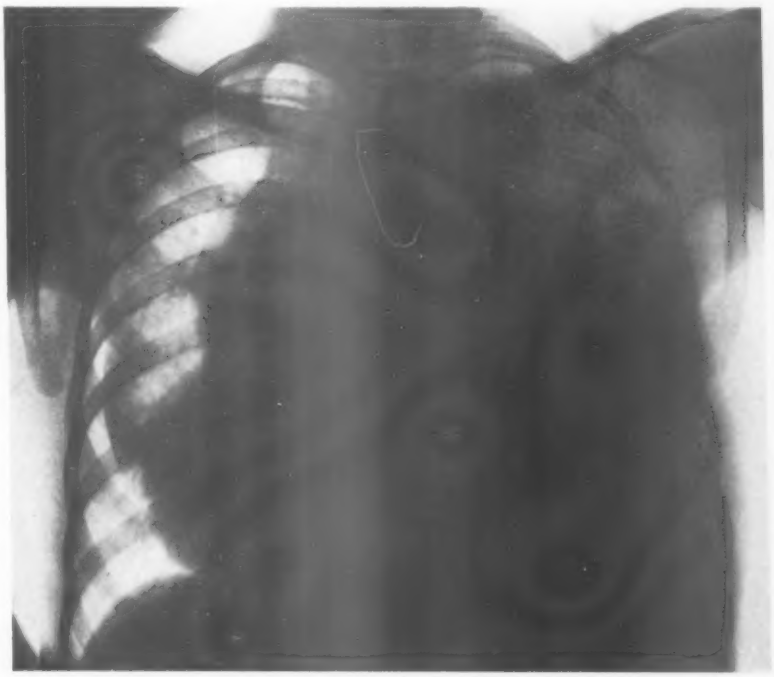

FIG. 1. SARCOMA.

Showing marked displacement of the heart, vessels and trachea to the right.

*Read before the Baltimore Roentgenological Society, April 27, 1917.

ally aid in determining the correct diagnosis.

With the exception of aneurysms which produce definite and unmistakable roentgenological signs, growths in this region are by far the most common of all conditions with which we have to deal. These growths may be of a malignant or benign nature. The malignant tumors comprise the sarcomata and carcinomata; under the benign tumors are included lymphomata, fibromata, myomata, lipomata, chondromata, osteochondromata, simple cysts, dermoid cysts, hydatid cysts and teratomata. The malignant growths are by far the most common of mediastinal tumors. Sir Richard Douglas Powell of London, in *The Practitioner*, states that 90 per cent. of intrathoracic growths are malignant.

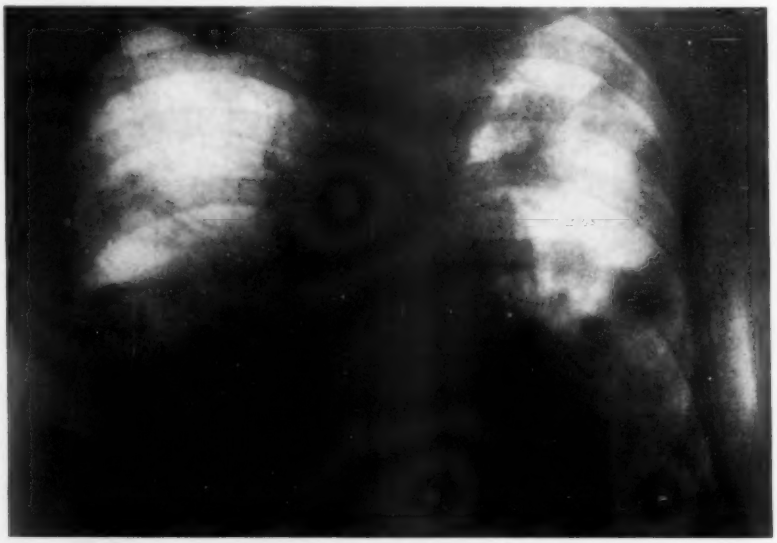

FIG. 2. CARCINOMA.

Mediastinal involvement with metastasis in the lungs. Characteristic irregular splotches with indefinite outlines.

Sarcoma.—A majority of the mediastinal tumors are sarcomatous in origin. They arise, as a rule, in the connective tissue and in the lymph nodes abounding in this locality. They may occur at almost any age, a number of cases in children having been reported; but generally they appear between the ages of 20 and 50. They may be divided structurally into two classes, the spindle-celled sarcomata, and the lymphosarcomata. The latter are by far the most common, and, as a rule, are irregular growths with sharply defined outlines, often somewhat nodular in shape, and extending far beyond the limits of the mediastinum. These tumors do not tend to invade or infiltrate the surrounding tissues, but often cause marked displacement of the viscera. Fluoroscopically, a slight movement of the mass may occasionally be noticed, due to pressure upon the aorta, but there is an absence of expansion. The spindle-celled sarcomata are generally invasive in character; they have indefinite outlines, and extend, as a rule, equally in all directions.

Carcinoma.—Primary carcinoma in the mediastinum is a comparatively rare condition. When present, it originates in the esophagus, the larger air-passages or the thymus. Its characteristic method of growth is by invasion of the tissues. These become infiltrated and thickened and are represented on the screen or plate by areas of irregular density, often extending beyond the limits of the mediastinum and into the lungs. The mass is not walled off,

its edges gradually blending with the surrounding tissues. When the esophagus is the primary seat of the growth, the use of the opaque meal will often be an aid in determining the location and extent of the lesion. Secondary carcinoma is more common than primary, and its appearance from a roentgenological point of view is the same. It must be remembered that tuberculosis of the lungs and carcinoma may occur at the same time.

Dermoid cysts.—Of the benign tumors, dermoids are probably the most common. These are usually situated in the upper part of the mediastinum near the anterior chest wall, and generally extend either to the right or left of the median line, and are seldom centrally located. They have well-defined outlines and are sometimes very difficult to differentiate from aneurysms, since not infrequently they pulsate, owing to their proximity to large vessels, and it is only by a careful fluoroscopic study, the mass being viewed from different angles, that it is possible to differentiate between the two conditions. Occasionally, opaque shadows of bones or teeth may be seen in the tumor mass, and such a finding, of course, at once determines the diagnosis.

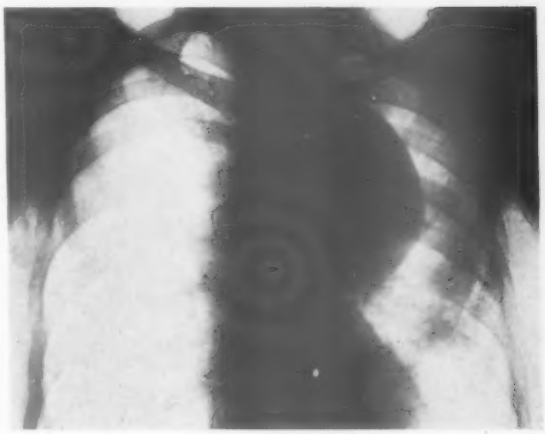

FIG. 3. TERATOMA.

Note the sharp outlines in comparison with the heart shadow.

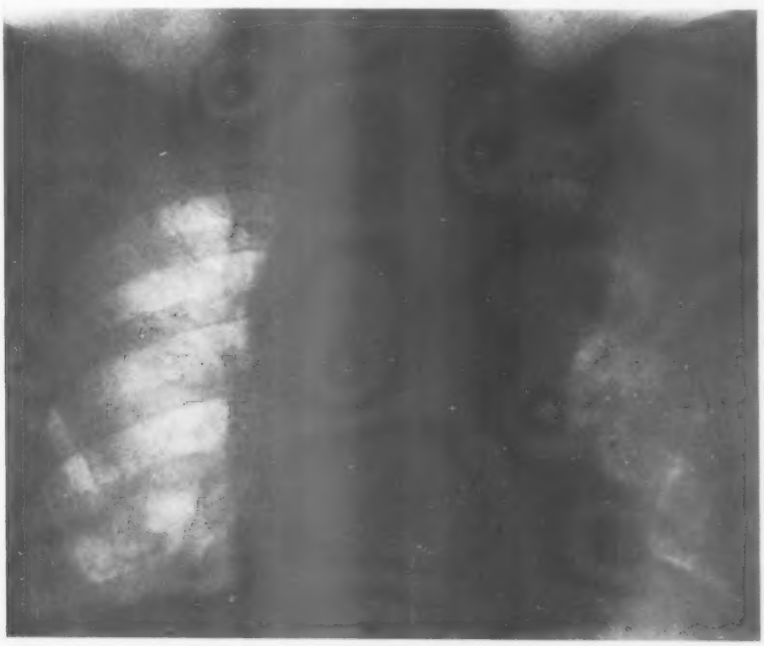

FIG. 4. ANEURYSM.

Descending aorta. The lack of sharply defined edges indicates pulsation.

Teratomata.—These resemble dermoid cysts in their location and general characteristics. They are usually flattened out against the anterior chest wall, and, according to Christian in Osler's "Modern Medi-

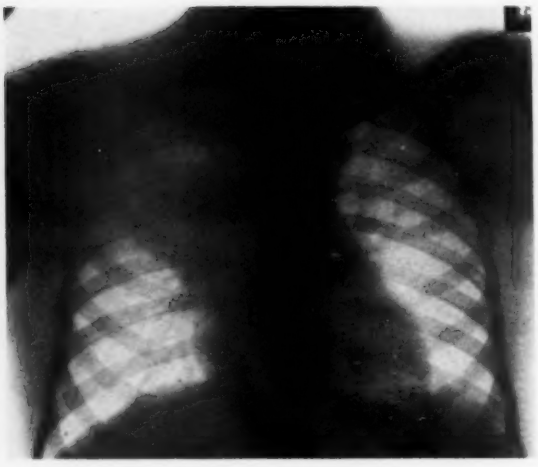

FIG. 5. HODGKIN'S DISEASE.

Enlargement of the mediastinal lymph glands. The axillary and supra-clavicular glands are also enlarged; this is especially noticeable upon the right side.

cine," expand in three directions: upward through the superior aperture of the thorax; laterally into the pleural cavity; downward between the heart and lungs.

Hyperplasia of lymph nodes.—This usually occurs in children and is generally tuberculous, the glands often containing a deposit of calcium, which is not found in malignant conditions. In adults the peribronchial lymph nodes may become enlarged and sclerosed, especially in miners and those exposed to dusty atmospheres. In other cases the hyperplasia may be the result of malignant metastasis or of Hodgkin's disease. In the latter condition, glandular enlargements may be noticed both in the axilla and in the neck; and the lungs may be infiltrated, giving the impression of a tuberculous process. In roentgenograms they are represented by shadows which are usually oval or elongated and appear either singly or massed together.

Abscesses of the mediastinum occur either in the anterior mediastinum as a result of broken-down lymph glands or caries of the sternum or ribs. In the posterior mediastinum they come from dorsal Pott's disease. When these abscesses are of long standing, they often contain calcium deposits in their walls, the pus at times becoming inspissated. The roentgenological shadows of these conditions are unmistakable. They have sharp outlines and the location can usually be determined by means of the fluoroscope.

Diverticula of the esophagus usually occur in the lower mediastinal region and can be determined by the use of the opaque meal.

Hernia in this region is a rare condition. The abdominal viscera, usually the stomach or transverse colon, are occasionally found in the posterior mediastinum, having passed through the dilated esophageal opening in the diaphragm. The opaque meal will also very readily determine this condition.

Echinococcus cysts and hematomata rarely occur in the mediastinum. They may, however, be seen at the bases of the lungs.

The mediastinal region should always be examined by the combined method; the fluoroscopic examination being checked up with stereoscopic plates, which will also serve as permanent records.

In making reports on roentgenological findings, it is better to describe, as accurately and intelligently as possible, what we see, and then supplement these data with a few remarks or suggestions as to the probable conditions present. Only in ex-

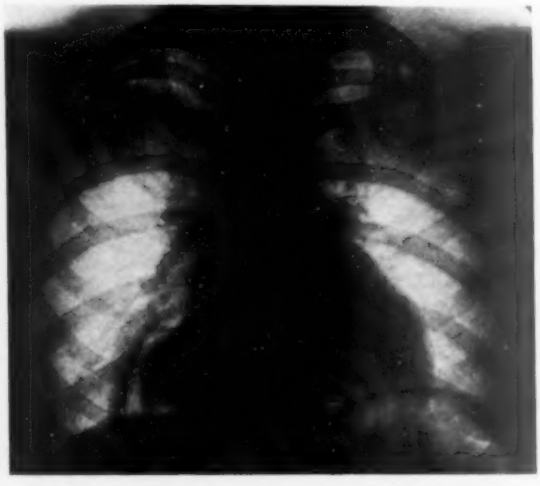

FIG. 6. DIAPHRAGMATIC GASTRIC HERNIA.

Showing bismuth in the stomach above the right diaphragm. The gas shadow beneath the left diaphragm is transverse colon.

ceptional cases should an unequivocal diagnosis be made.

Many of the chest examinations are made for the purpose of revealing obscure conditions, the nature of which the clinician has not been able to determine, and it is unreasonable to expect the roentgenologist to arrive at a full diagnosis from his examination alone. But although one cannot differentiate a lymphadenoma from a lymphosarcoma, one can describe quite accurately the size, position and shape of the mass, and what effect it has exerted upon the surrounding structures, such as displacement of the viscera, or pressure on the lungs or bronchi, with resultant atelectasis or pleural effusion; and when all these data are weighed by the clinician in conjunction with a full history and complete physical examination of the patient, a correct diagnosis is very likely to be made. The greatest benefit can be derived, however, from a joint conference between the roentgenologist and the clinician.

Conclusions.—Aneurysmal shadows vary according to their location, and always show intrinsic pulsations. They are never nodular in form.

Sarcomata usually show clear-cut shadows, which are irregular or nodular in character. They are rarely symmetrical and often assume large proportions.

Spindle-cell sarcomata are invasive growths with indefinite outlines, extending, as a rule, equally in all directions.

Carcinomata do not have a typical roentgenological appearance. They usually metastasize by means of the lymphatics. The lungs are often involved and show signs of malignant infiltration.

Hodgkin's disease usually shows irregular and nodular shadows due to the hyperplasia of the mediastinal glands, and is generally accompanied by lung infiltration similar to that of tuberculosis. It is not uncommon to find the axillary and supraclavicular glands also enlarged. In children enlarged mediastinal glands are nearly always tuberculous, and frequently show deposits of calcium.

Dermoids and teratomata generally occur high in the mediastinal region, on either side of the median line, and show clear-cut symmetrical outlines. They may easily be mistaken for aneurysms.

Abscesses as a rule are centrally located, and if of long duration often contain calcium deposits within their walls. Their shadows are generally uniform in outline.

A characteristic sign, and often a determining factor in diagnosing mediastinal tumors, is the displacement of the trachea either to the right or left of the median line.

THE ROENTGEN DIFFERENTIATION OF CAVITIES, RETRACTIONS AND PARTIAL PNEUMOTHORACES IN THE CHEST

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THERE is occasionally observed in roentgenograms of the tuberculous chest large vacant areas in the normal lung fields that may appear at either the apex or base. These areas are referred to as vacant areas because there is lacking detail of any shadows which could be interpreted as either normal or pathological lung parenchyma. There are three pathological conditions which might produce such an appearance: I. Cavity; II. Retraction; III. Partial pneumothorax. There is one constantly appearing sign in all three conditions; that is, an absence of the linear bronchial tracings. I shall attempt briefly to give the roentgen characteristics of these three conditions with the idea that these characteristics may serve some purpose in the roentgen differential diagnosis.

I. Caseation cavities of very large size

are frequently observed in either the apex or base of the lung. These cavities many times lie just beneath the visceral pleura, and the adherent visceral and parietal pleura may form a portion of the cavity wall. These cavities are sometimes found extending from the axillary border of the lung to the mediastinal or cardiac border, and from the extreme apex to the hilus region. Such a cavity situated at the apex is usually well drained through a large bronchial opening and there is no exudate within it to cast obscuring shadows. Such a cavity might readily be confused with a partial pneumothorax or a massive apical retraction. The general characteristics of cavities are: 1. The absence of linear bronchial tracings. 2. May be located at either the apex or base. 3. Rarely ever occupies the entire area from border to border. 4. Rarely extend to the extreme apex. 5. Thick fibroid walls are usually demonstrable. 6. When one of the walls extends to and includes the visceral pleura there is usually a marked thickening and fibrosis of the pleura which shows as a cloudy area in the roentgenogram. 7. The shape is usually of a rounded or circular character with irregularities conforming to adjacent dense tissues or viscera. Occasionally a large cavity occupying the entire apex of the lung is observed in which the pleural fibrosis is not sufficient to cast dense shadows, and my experience has taught me that this type of cavity is quite as difficult to differentiate at autopsy from a pneumothorax or lung retraction as it is in roentgen ray plates. The only final proof of such a condition lies in a microscopic examination of the upper lung margin for pleural vestiges.

II. Lung retractions due to the contraction of a fibroid parenchymal lesion usually show a characteristic roentgen appearance. The area in which there is absence of lung parenchyma is usually situated at the extreme apex, and instead of being of a general circular character as most caseation cavities are, the area is usually of a very irregular character, and usually the definite limitations and the outline of the visceral pleura are sharply shown. Apical retractions are frequently diagnosed by the clinician by physical methods of examination, but roentgenologically we are not able to confirm the presence of these retractions. With the development of the roentgen method of examination we realize that the conditions that the clinician frequently diagnosed as apical retractions are not anatomically retractions, but in the majority of instances are lesions of a fibroid, consolidated or non-aerated character situated at the extreme apex. The roentgen characteristics of apical retraction are: 1. Absence of linear bronchial tracings. 2. Location chiefly at the apex. 3. The shape is usually irregular, rarely of a rounded or circular character. 4. The outline of the visceral pleura is usually clearly shown. 5. The areas outside of the retraction are usually clear. 6. The area in which there is an absence of lung parenchyma usually extends from the axillary border to the mediastinal border.

III. The partial pneumothoraces from which the foregoing lesions must be differentiated are those usually occurring along either the axillary or mediastinal border of the lung. They are partial pneumothoraces, because adhesions prevent them from becoming complete. Occasionally these small partial pneumothoraces are formed and are shortly afterwards filled with serous exudate which in turn becomes fibrinous, forming a dense fibrosis of the visceral pleura and preventing the re-expansion of the collapsed areas. When such dense limiting walls exist it is sometimes exceedingly difficult to differentiate this type of collapse from a large cavity. The roentgen characteristics of partial pneumothorax are: 1. The absence of linear bronchial tracings. 2. The location, as a rule, is in the bases, rarely occurring at the apex. 3. The outline of the lung and visceral pleura can be usually shown. 4. The shape is always irregular, never rounded or circular. 5. Pleural adhesions can in many instances be visualized as bands or strings extending from the parietal pleura to the collapsed lung.

THE IMPORTANCE OF THE POSITION OF THE UPPER ARM IN THE DETECTION OF ROENTGENOLOGICAL SHADOWS IN THE REGION OF THE SHOULDER JOINT

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DURING the last three years it has been my good fortune to have had the opportunity of examining a great many shoulder joint lesions, and I have been very much surprised to find what a large percentage of these examinations have shown definite roentgenological shadows in the region of the subdeltoid bursa. However, not until quite recently have I found how easy it is to miss some of these small shadows on examination of plates unless stereoscopic plates or multiple positions of the shoulder joint are taken.

I have found in my experience that there is one position which has been of especial benefit to me in bringing out these shadows most clearly in the subacromial region; namely, with the patient in the recumbent posture, the affected shoulder flush on the plate, the upper arm abducted to a right angle, rotated outward, the forearm flexed at the elbow to about 45 degrees, and the opposite shoulder slightly elevated by a sandbag.

This position, although somewhat painful at times for the patient, is easily maintained if the arm be held either by an assistant or by a bandage applied around the wrist and then fastened to some part of the table. This position has proven its value to me on several occasions, and it is my practice with any question of a bursitis always to utilize it, in addition to the anteroposterior position, with arms at the sides. One roentgenogram in the prone position, with upper arm abducted, is important. These four positions I believe to be absolutely necessary if subdeltoid shadows are to be excluded, although many may prefer stereoscopic plates.

I have no doubt that a great many men are satisfied in taking simply anteroposterior plates; that is, one with the back of the shoulder, or one with the front of the shoulder next to the plate. In the majority of cases one or both views might suffice, but since I have been employing these various positions, I have been surprised to find how many times these shadows have appeared only on the plates in which I have used the abduction and rotation of the humerus, whereas in the simple anteroposterior plates nothing abnormal could be observed.

A review of the literature published during the last two years with reference to the shadows in the subacromial region has been exceedingly interesting to me, and from a roentgenological standpoint it is quite plain to see how careful we must be in formulating a diagnosis with reference to these shadows.

A year or two ago we would have had little hesitation in calling these shadows calcified subdeltoid bursæ. To-day there is no positive proof that we can rely upon as being absolute, as to whether or not these shadows are in the bursa proper, in the tendons of the spinatus muscles, or even in the capsule of the joint itself. From a surgical standpoint considerable careful work must be done at time of operation, and careful observations as to the exact location of this increased density made, followed up by a definite pathological report together with chemical analysis in order to determine whether this is a true calcification or not.

Berry in his article has very properly brought this to the attention of the surgeon, and we find that these shadows have been interpreted in various ways. Painter suggests that they are due to a thickening of the walls of the bursa; Baer to scar tissue; Beltz to fluid under pressure and hemor-

rhage; and again Painter, Codman, Brickner, Ely, Dunlop and others to a deposition of calcium salts. Sometimes the deposition of salts has been in the bursa proper, at other times in the wall only, and again in the tendon of the supra or infraspinatus muscle. Of course, it may not interest us or be of so great importance as to whether these shadows are in the spinatus tendon or the bursa proper, but in formulating a diagnosis which we must return to the surgeon, it would seem well to me, for a while at least, to simply content ourselves with stating that shadows are present in the subacromial region, but not to make a positive diagnosis of calcification of a subdeltoid bursa.

In following up one or two of these cases of shadows in the subacromial region after operation, I have found that occasionally not all of the foreign body has been removed, although symptoms have entirely subsided; and, as Berry has well brought out, conservative treatment sometimes shows the disappearance of these shadows after a few weeks' careful treatment.

With this in mind,—the possibility of these patients going for several months after the roentgenological examination is made,—it would seem to me quite proper for us to observe the same rule which we do with reference to renal calculi; that is, to have roentgenograms repeated within a short period of the time of proposed operation.

I have in my offices several plates which illustrate the appearance of these shadows in the subacromial region, and also plates of two cases taken in a position of abduction and external rotation of the upper arm, the only position which has brought these shadows into clear view. Two other plates in my possession show the existence of similar shadows in the region of the greater trochanter and internal condyle of the femur.

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LEAD GLASS AND LEAD RUBBER—U. S. BUREAU OF STANDARDS

BY E. B. ROSA

Acting Director

WASHINGTON, D.C.

X-ray work has recently been added to the activities of the Bureau of Standards. It is intended that this work shall ultimately include the entire field of *x*-ray testing and standardization. The routine determination for the general public of the effective lead content of protective materials has been successfully initiated and other lines of testing will be developed in due course. The importance of testing protective materials is indicated by the experience of the Bureau. Of a dozen pieces of lead glass purchased about a year ago in the open market two were found to offer no more protection than ordinary plate glass.

The desirability of increased protection from the *x*-rays was generally admitted and at the suggestion of the Bureau several manufacturers of lead glass and of lead rubber began experiments in the endeavor to increase the quality of their products, with the gratifying result that lead plate glass was produced of eighty per cent higher quality, and lead rubber of one hundred per cent higher quality than those of the materials previously upon the market.

The Bureau of Standards invites correspondence with those interested in its *x*-ray work.

SOME UNUSUAL STOMACH CASES

BY ALBERT M. COLE, M.D.

INDIANAPOLIS, IND.

CASE I. PERFORATING CARCINOMATOUS GASTRIC ULCER ON THE GREATER CURVATURE

Patient.—Mr. H. D. T. Age 34. Examined October 3, 1917.

History.—Symptoms began four months before, consisting of pain of a dull character coming on when the stomach was empty, located in the epigastrium and relieved by food. This is rather a typical duodenal ulcer history. There was no tenderness, no nausea or vomiting and appetite was good. Altogether the symptoms were mild, but on physical examination there was noted a small tumor mass about the size of an egg above the umbilicus.

Fluoroscopy, with the stomach filled with the opaque meal, showed a "filling defect" on the greater curvature near the pylorus. There was a very pronounced Haudek's niche (Fig. 1). No pyloric obstruction was noted as the stomach showed no six hour residue.

A diagnosis was made of gastric ulcer with a probable carcinomatous degeneration. On account of the depth of the ulcer crater, as shown by the extensive niche, immediate operation was advised. Three days later the patient was seized with severe abdominal pain with all the symptoms of intense shock and died four hours later. Autopsy revealed a perforation in the ulcer area and extensive metastasis of carcinomatous nature along the lower border of the liver.

The unusual features of this case are the short and mild history, the situation of the ulcer on the greater curvature and the brief duration of the symptoms following perforation (4 hours) and preceding death.

CASE II. SPASMODIC HOURGLASS STOMACH UNAFFECTED BY BELLADONNA

Patient.—J. C. H. Examined April 30, 1917.

History.—Trouble began three years ago with severe pain immediately after eating. It was located in the epigastrium and relieved by nothing. Heavy coarse food increased the pain. There was tenderness on pressure over the epigastrium. Some nausea and vomiting—vomit consisted of fluid and some food. Constipation severe. Loss of twenty-five pounds in weight. Appetite good. No stomach-contents analysis made.

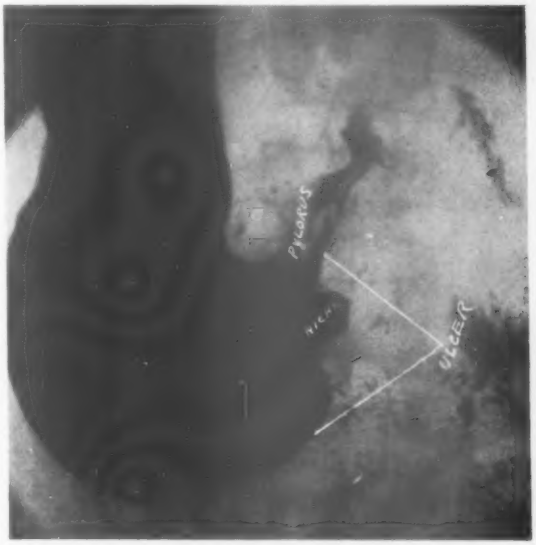

FIG. 1. CARCINOMATOUS GASTRIC ULCER ON GREATER CURVATURE AT PYLORUS.

Fluoroscopy revealed a "purse string" constriction near the pylorus. It appeared not unlike a deep peristaltic wave but it was constant (Fig. 2). The real peristaltic waves ran through it. Palpation made no impression on it and pain was elicited on deep pressure over this area. A series of plates were taken and another fluoroscopic observation was made later, but the constriction still persisted. There was no six hour residue or other roentgen evidence of organic disease. Suspecting that it was

FIG. 2. SPASMODIC HOURGLASS STOMACH.

spasm the patient was given Tr. Belladonna for four days—dose 20 drops four times daily, increased to 30 drops four times a day. At the end of this time the patient returned showing the usual symptoms following the administration of belladonna. The stomach was now again filled with the opaque meal and the same findings were obtained. A diagnosis was now made of organic "hourglass" stomach, probably due to ulcer. Operation showed no stomach lesion but a diseased appendix. During the operation the surgeon noted at times that the stomach muscles showed this same constricting ring. A report from the patient several months after operation stated that there was marked improvement in the gastric pain. This case proves that there are exceptions to the rule that belladonna will relax gastric spasm that simulates "filling defects."

CASE III. ORGANIC HOURGLASS STOMACH WITH PERFORATION INTO DUODENUM

Patient.—Mrs. D. H. B. Age 35.

History.—Gastric pain had been complained of for many years. The pain came on soon after eating and at times was very intense and located at the epigastrium. There was no vomiting and no hemorrhage. The appetite was always good, but during the last year there had been considerable loss of weight.

Fluoroscopically it was noted during the injection of the barium meal that only the cardiac portion of the stomach filled. However, before the meal was all taken it was observed that the pyloric end began to fill through an apparent constriction in the pars media. At the end of the meal the stomach showed its classical "hourglass" form with the stomach divided into equal halves. There was noted a Haudek's niche on the lesser curvature opposite the constriction. A further study under the screen showed the second portion of the duodenum filled and attached to the lesser curvature and the barium passing directly from the lower portion of the upper pole of the stomach into the duodenum (Fig. 3). No pylorus could be visualized. A six hour observation showed the upper pole empty (Fig. 4), and the lower pole fully filled. A

FIG. 3. ORGANIC HOURGLASS STOMACH WITH PERFORATION INTO DUODENUM.

twenty-four hour observation disclosed the lower pole still well filled.

A diagnosis was made of organic "hour-glass" stomach due to callous ulcer on the lesser curvature with perforation into the duodenum.

On operation it was found as described; the pylorus and duodenum were bound by adhesions to the lesser curvature. A gastro-gastrostomy and a gastrojejunostomy were done. Fig. 5 shows the result three months after operation.

FIG. 4. SAME AS FIG. 3—SIX HOURS LATER.

FIG. 5. SAME AS FIG. 3 AFTER OPERATION.

CASE IV. DUODENAL ULCER SHOWING NO CAP DEFORMITY

Patient.—Mr. W. F. B. Age 31.

History.—For several years the patient has complained of a dull pain coming on three to four hours after eating, felt in the epigastrium and relieved by food. There were distinct periods of remission. Two attacks of hemorrhage by mouth and bowel occurred—the second attack severe with a vomitus of pure blood. There had been no loss of weight and the appetite was good. Altogether the history was quite typical of duodenal ulcer.

Two roentgen examinations were made several months apart. At neither examination were there any roentgen findings indicative of an organic lesion. A series of

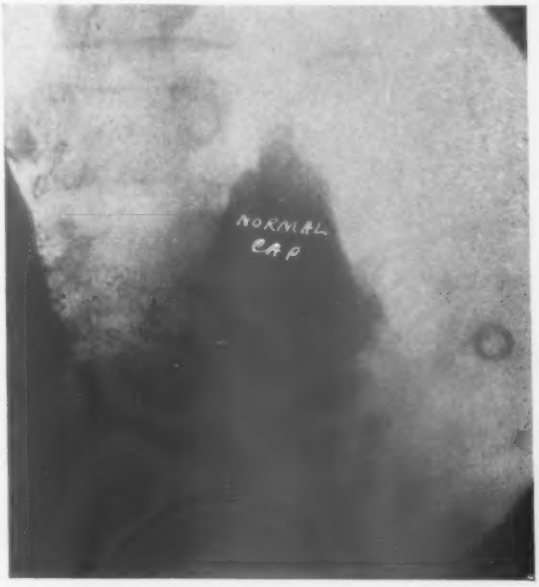

FIG. 6. DUODENAL ULCER SHOWING A NORMAL CAP.

plates at both examinations gave a constant normal cap (Fig 6). Lateral plates also gave a normal cap outline.

Operation revealed a small deep ulcer on the posterior surface of the first portion of the duodenum. The bowel otherwise was in appearance perfectly normal, with (as the surgeon expressed it) no "puckering" of the duodenal wall, which would deform the outline of the cap.

PERIOSTEAL SARCOMA IN A DOG

BY WILLIAM H. STEWART, M.D.

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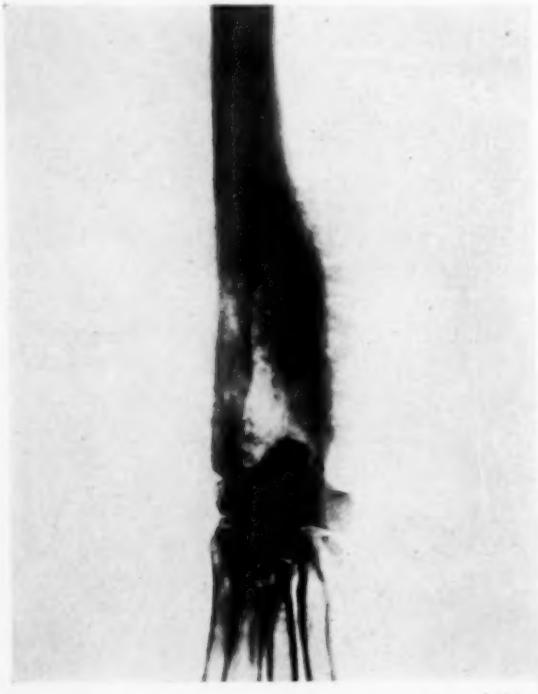
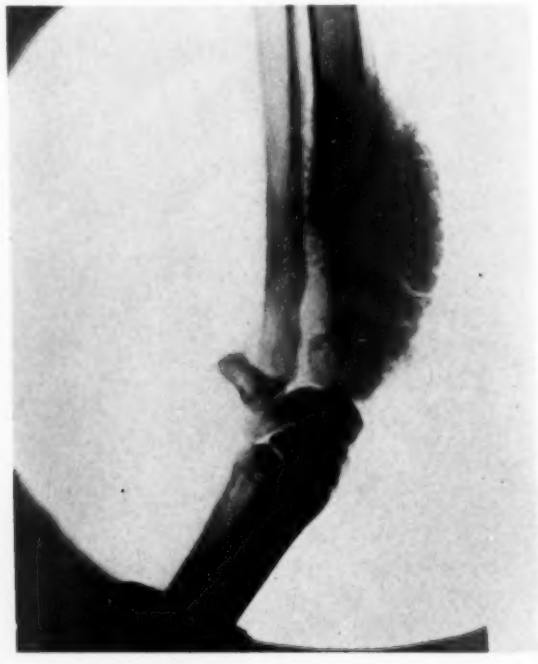
NEW YORK

THE patient was a dog, six years old, of average size for a Great Dane. He was spending the summer at Long Lake in the woods and was apparently in perfect health. About August 1, 1917, he started off on a hunt with another dog and was away twenty-four hours. On returning home, he was a little lame; this cleared up entirely. On September 15, 1917, it was noticed that there was a swelling on the dog's right front leg and that he was limping again. The swelling gradually increased in size until he walked on three legs and acted as though he were in pain.

Roentgenographic examination revealed all the characteristic shadows of a periosteal sarcoma, such as we see in the human being.





The swelling continued to grow larger and was apparently more painful until January 2, 1918, when the dog was chloroformed.

A METHOD OF OBTAINING AN ACCURATE LATERAL ROENTGENOGRAM OF THE SHOULDER JOINT

BY W. S. LAWRENCE, M.D., B.S.

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MEMPHIS, TENN.

IN THE JOURNAL for April, 1916, I suggested a new position for radiographing the shoulder joint, in order to obtain a plate at right angles to the ordinary anteroposterior view. The method suggested was briefly: patient standing, arm extended, cone in axilla, ray directed upward, and plate held in position on top of shoulder and extended arm. This procedure does give a plate at right angles to the ordinary anteroposterior position and is of considerable diagnostic value in certain cases, but its limitations are many, arising chiefly from the fact that an injured or diseased shoulder will not permit the arm to be extended to a sufficient degree to render this method feasible.

To overcome this difficulty I have been using recently still another position. This third position gives a true lateral view of the shoulder joint, with all the additional information that a lateral view of any other joint will give; is applicable in almost any and every case; and subjects the patient to no pain or inconvenience whatsoever.

I have not seen this position or method of radiographing the shoulder described by any one so far, nor have I seen any published plates illustrating it. I will therefore describe briefly the method as I use it now in the examination of nearly every case of injury to the shoulder joint.

The chief point in this method of examination is the getting rid of the other shoulder, and that is accomplished in this way. Using a table with tube stand attached, the patient is placed standing laterally at the foot of the table with the injured shoulder away. The tube and cone are then revolved so as to make the central ray parallel to the long axis of the table and also to a line passing through the two shoulders of the patient. The uninjured arm is then raised well above the head, which elevates the shoulder on this side. At the same time the injured shoulder is allowed to droop as much as possible. The cone is then brought snugly into the axilla of uninjured side.

FIG. 1. ORDINARY ANTEROPOSTERIOR VIEW OF A FRACTURE OF THE NECK OF THE HUMERUS.

From the shape of the head one might think that the shaft is driven into the head, splitting it.

The tube-bearing arm of the tube stand is then fixed and the patient requested to lean against the cone for support. It will then be found that the central ray will be passing entirely beneath the uninjured shoulder, through the easily penetrated chest between the spine and the sternum and through the head of the humerus of the injured shoulder. If this should not be the case the central ray can easily be made to take this direction by tilting the tube a little one way or the other. The plate is now held firmly against the injured shoulder at right angles to the line of direction of

FIG. 2. LATERAL VIEW OF FIG. 1, SHOWING THAT THE SHAFT IS ENTIRELY IN FRONT OF THE HEAD.

the central ray and so that the head of the humerus falls about the center of the plate.

The patient is then instructed to take a deep and full inspiration and hold it while the exposure is made. This, by increasing the bulk and practically not the weight of the lung tissue, thus rendering it more transparent, and at the same time by increasing the distance between the sternum and spine, is of considerable service. For a patient of average size I use an intensifying screen to shorten the time of exposure, but for small adults and children this is unnecessary. The time of exposure, however, is relatively long owing chiefly to the distance the tube is thrown from the plate.

Plates made in this way are not intended to take the place of stereoscopic plates, but certainly the information they give is accurate and very easy to be understood. The accompanying plates are self explanatory.

RADIOTHERAPY OF SURGICAL TUBERCULOSIS

Van Ree gives fifty-seven double illustrations showing the condition before and after roentgen treatment, mostly of tuberculous glands in the neck. In this group of tuberculous glands a complete cure was realized in thirty-five out of forty-eight; only two failed to show marked benefit. The cases showing mere improvement to date may go on to a complete cure in time. One great advantage of the treatment is that the healing proceeds without leaving disfiguring traces. From eight to ten exposures were the average course, some cases needing very few and others requiring a whole year. The exposures were about 4 H units and the intervals about three weeks. These small doses do not modify the tissues around so as to make operative measures more difficult in case they are deemed necessary later. Tuberculous lesions in small bones healed promptly in seven of his thirteen cases of this kind. In one case of a tuberculous lesion in the sternum, the necrotic masses were excised, followed by smooth and rapid healing under the exposures. The benefit in some cases of bone and joint tuberculosis was so striking that further efforts in this line are encouraged even although this treatment failed in a certain proportion of the old cases, especially in adults. Certain experiences on record warn against exposing the larger joints of children to the roentgen rays as liable to interfere with normal growth later. (*Nederl. Tijdschr. v. Geneesk. Amst.*, Sept. 1, 1917, II, No. 9, pp. 751–830.) (Ref. *Jour. Am. M. Assn.*, Dec. 1, 1917, p. 1917.)

ROENTGENOGRAMS OF A CASE OF MYXOMA OF FEMUR

BY ALBERTUS COTTON, M.D.

and

STANDISH MC CLEARY, M.D.

BALTIMORE, MD.

[Note. The interesting cuts of myxoma of the femur, which follow, properly belong with the report of the case by Cotton and McCleary which appeared in the February, 1918, number of the JOURNAL, pages 95–97. Unfortunately the plates were received too late for insertiom in either the February or March numbers, but the importance of the case is such that with Dr. Cotton's consent we have printed the cuts so that the bound volume of the JOURNAL will contain them for the index.—Editor.]

FIG. 1. ANTEROPOSTERIOR UPPER END OF FEMUR, INCLUDING HIP-JOINT.

Taken before the first exploratory operation. Shows enlargement of shaft of bone; rarefaction of bone to and including trochanter major; irregularity of outline of cortex. Neck and head of femur and acetabulum normal.

FIG. 2. ANTEROPOSTERIOR VIEW OF SHAFT OF FEMUR TAKEN BEFORE FIRST OPERATION.

Same as Fig. 3. Note outline of tumor in soft tissue and new bone formation in muscle.

FIG. 3. LATERAL VIEW OF SHAFT OF FEMUR TAKEN BEFORE FIRST OPERATION.

Shows enlargement of bone; rarefaction; irregularity of outline of cortex; areas of new bone formation of periosteum extending into muscles; operative wound of bone, made by first surgeon in attendance.

(*a*) The whole shaft of femur from neck to condyles was involved in the pathological process.

(*b*) There was enlargement of the bone with rarefaction and thinning of outer compact bone.

(*c*) The rarefaction was not uniform; some areas more marked than others.

(*d*) Contour of bone was irregular on all surfaces.

(*e*) At the middle of bone an area about three inches long and involving one-third circumference was shown where bone had been removed by operation.

(*f*) Along the shaft of bone, especially at site of previous operation, were numerous small projections of new bone extending outward from periosteum in different directions.

An incision was made over the soft part of the tumor in the old scar. A cystic area was found containing a serosanguinolent fluid, with wall of soft friable material like granulation tissue. The cyst extended into the bone at site of previous operation. The bone itself was rough and irregular under the periosteum, with small processes of new bone extending in different directions into surrounding muscles which were firm and hard. No tumor tissue other than the

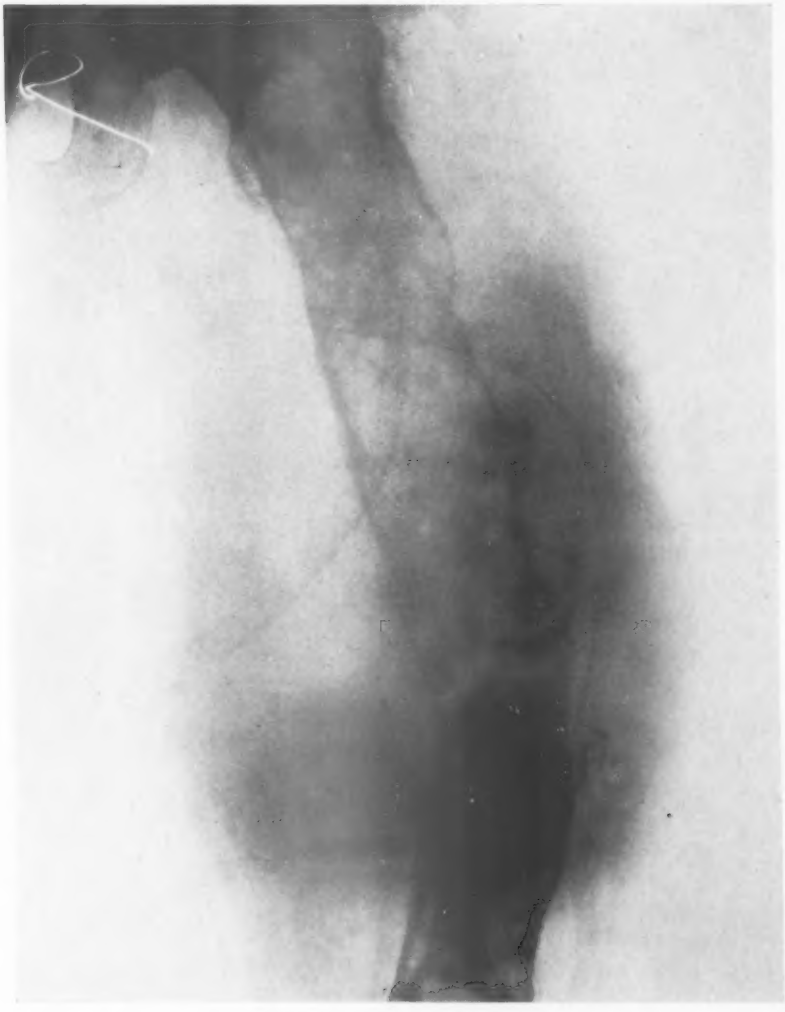

FIG. 4. ANTEROPOSTERIOR VIEW OF FEMUR, TAKEN BEFORE AMPUTATION.

Enlargement of bone; very marked rarefaction, with thinning and irregularity of cortex; new bone formation from periosteum extending into muscle. Pathological fracture at site of old operative wound in bone.

soft friable tissue and spicule of new bone was noted in the exploration.

Tissue removed showed process of repair, granulation and fibrous tissue with new bone formation. There is no evidence of malignancy.

Sections were made of the gelatinous material contained in the loculi found in the bone. This material is composed of pure myxomatous tissue, showing the characteristic stellate cells, slight fibrillar framework, and the gelatinous ground substance. At places in the section, rather robust bands of fibrous tissue are seen traversing the ground substance.

Sections from the osseous tissue show two distinct processes taking place. Areas showing distinct resorption of bone are met with, and with these are areas in which new bone formation is actively progressing. There are present osteoblastic cells forming cartilage and the beginning of new lamellæ.

The pathologist's diagnosis of this case is not osteosarcoma but myxoma, a non-malignant tumor.

FIG. 5. LATERAL VIEW. SAME APPEARANCE AS IN FIG. 4.

Note particularly the shadow of tumor in the soft tissues and the enlargement of the thigh.

FIG. 6. PHOTOGRAPH OF SPECIMEN REMOVED AT OPERATION.

Showing femur split longitudinally from trochanter to condyles; bone destruction and pathological fracture of middle of femur; tumor mass in medulla and extending along shaft of bone underneath the periosteum, especially from center of bone to greater trochanter; tumor mass in soft tissues with cystic cavities and areas of new bone formation.

FIG. 7. PHOTOGRAPH OF DISARTICULATED HIP AND THIGH FROM HEAD TO CONDYLES, INCLUDING BONE, SOFT TISSUES AND TUMOR.

Note circumference of thigh at middle.

REPORT OF A CONGENITAL CASE OF SYPHILIS OF THE STOMACH*

BY G. VON POSWIK, M.D.

SCRANTON, PA.

PATIENT was referred to me on May 8, 1915. He was 28 years old, married 6 years, had one healthy child and his wife had had no abortions. At the time of examination the patient weighed about 118 lbs. He was weak; appetite was good; bowels would not move unless medicine was administered, but always normal in consistency, no mucus or blood.

Patient slept well, had never been sick and denied all kind of infection. I was particularly careful in regard to that part of the history. His main symptoms were pain below the ensiform, increased on pressure, and vomiting after eating. After partaking of food he belched and had a nasty, sour taste in his mouth. His vomitus often contained food from the day previous with a

*Read at the Eighteenth Annual Meeting of The American Roentgen Ray Society, New York City, September 20 to 22, 1917.

great deal of bile. He stated he had lost 43 pounds within a year. The gastric contents showed retention and absence of hydrochloric acid.

ROENTGEN EXAMINATION

In the fluoroscope the diaphragm was perfectly normal. There was a great hypotonicity of the cardiac end. The entire stomach was no larger than a medium-sized grapefruit and had a funnel-like shape. Neither pylorus nor duodenum could be demonstrated, but in the plate a slight residue was seen near the pylorus. It was evident that the entire fundus and pylorus were infiltrated and food could not pass readily. The patient could not take the entire barium meal. Although the food could not be observed passing the pylorus, the stomach emptied at the normal time. The food had entered the colon to the splenic flexure and a normal residue was found in the small intestines at the fifth hour. In 10 hours' time the small intestines were empty and the entire colon filled. After two days had elapsed I gave the patient a second test meal with the administration of a hypodermic of atropine. The patient after this administration could not retain the food as readily as at the previous test. Vigorous peristalsis was noticeable in the anterior wall of the small portion of the stomach that was not infiltrated. The patient felt very much nauseated. The stomach had the same shape as during the first examination. I would not give a definite diagnosis, but described the actual findings. An anterior gastro-enterostomy was advised. The patient consented within two days to have it done.

L. R.

FIG. 1. CONDITION OF STOMACH AT TIME OF FIRST EXAMINATION.

R. L.

FIG. 2. CONDITION OF STOMACH AT TIME OF SECOND EXAMINATION.

The operation disclosed the fact that the entire stomach except the cardiac end was heavily infiltrated. Where the peristalsis had shown, during the roentgen examination, way up in the cardiac end, there was some tissue through which an anterior gastro-enterostomy could be made with great difficulty. No glandular enlargement was found and the surgeon and his assistant diagnosed the case syphilis. A Wassermann was made and found 4 plus. The patient made an uneventful recovery and left the hospital in 10 days. He is still receiving vigorous specific treatment. On August 25, 1917, the patient returned at my request to the laboratory. I hardly recognized him. He weighs 150 pounds, feels well and does the hardest work in the mines, laying rails, which requires much bending and lifting. Upon questioning him

I found that since his operation he had discovered that his father had syphilis. His mother has good health.

But note the sequence in which congenital infection was carried:

No. 1. He is the oldest and has syphilis of the stomach.

No. 2. His younger brother is apparently well.

No. 3. His sister had a great deal of throat trouble and recovered under specific treatment; apparently well now.

No. 4. Another brother has a keratitis.

The latest roentgen findings of my patient show the stomach has not increased or changed in size. The gastro-enterostomy is working satisfactorily. The food does not remain any length of time in the stomach, which is still funnel-shaped, the gastro-enterostomy completing the funnel action. The stomach has not regained, under treatment, its normal elasticity. I wish to state in conclusion that in cases of syphilis I have found that a hypodermic of atropine will make the patient very uncomfortable, with symptoms of vomiting, nausea and depression, which helps me in making a differential diagnosis.

ROENTGENOTHERAPY IN GYNECOLOGY

Kouwer warns that roentgenotherapy for fibroma of the uterus is still in the tentative stage. Opinions are still divided as to whether the fibroma itself or the ovaries should be exposed. He warns further that our assumption as to the two separate functions of the ovary—the production of the ovum and of the internal secretion—is still purely hypothetical. But we have reason to assume that roentgen exposures carried far enough are equivalent to castration, and we do not know the damage that may be wrought by the exposures even stopping considerably short of this. Instances have come to his knowledge in which roentgenotherapy has been applied to young women to relieve dysmenorrhea, and even women who are thirty-five and forty years of age are not entirely excluded from roentgenotherapy by those who fail to appreciate the power of the roentgen rays acting in this region. The gynecologists have not failed to warn of the dangers from operations, and the majority refrain on principle from operating for uterine fibroma unless very serious indications call for it. But, he adds, the roentgenologists are not equally frank in regard to dangers from roentgenotherapy. The medical literature in the Netherlands has no reports of injury of patients from roentgen treatment. He knows that such cases exist, but where are the reports of them? In referring to the Freiburg method of abrupt and very powerful application of the rays, he says that it is not difficult to learn from the very reports of their 1,395 cases sent out by the Freiburg clinic the harm done in this or that case. "How does it happen," he exclaims, "that Freiburg is deaf and blind to them? How can it be explained that, nevertheless, the statements of König and Gauss are accepted by many as absolute authority?" (*Nederl. Tijdschr. v. Geneesk. Amst.*) (Ref. *Jour. Am. M. Assn.*, Dec. 8, 1917, p. 2008.)

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THE PRACTICE OF ROENTGENOLOGY BY LAYMEN

Considerable discussion among medical men has been aroused over the practice of roentgenology by laymen. It is unfortunately true that many leading medical and surgical institutions today place their main reliance in roentgenology upon the work of laymen, whose only qualification for the work they assume is a more or less special training in photography or electricity. Just as in the domain of physiology there are notable exceptions, some of our most prominent contributors to medical knowledge being men without medical degrees, so there are also in the roentgen ray field two or three instances where scientifically trained laymen, though lacking medical degrees, have made important and stable additions to roentgenological progress; but the exceptions in both classes of cases have been men with highly specialized training. It may be stated as a general proposition that diagnostic and therapeutic roentgen ray work can be safely intrusted only to men and women with medical qualifications. As has been repeatedly claimed in the pages of this journal, the real roentgenologic practice does not consist in the making of so-called "roentgen ray pictures," or even in the necessary electrical manœuvres to keep the fluoroscopic screen properly lighted up, but in the interpretation of the findings obtained by these means. In other words the real work of the physician practicing roentgenology begins where the technical work ends, and can only be performed by an individual with medical training.

Our British friends have been deeply interested in the matter of "lay radiographers and electro-therapeutists," as shown by the fact that the *British Medical Journal* has contained letters and editorial notes on the subject in almost every number for several weeks. The Medico-Political Committee of the British Medical Association has taken up the subject and has recommended that "the practice of radiography (the term used by the *British Medical Journal*, corresponding to 'roentgenology' in the pages of this journal) by unqualified persons ought not to be encouraged." Some would go even further and make the practice of roentgenology by laymen a penal offense, and they urge that laws be passed rendering it impossible for the practice of

roentgenology to be carried out by other than skilled and trained medical experts.

On account of the necessities of the war the military establishment has been obliged to employ hundreds of lay assistants in the roentgen ray departments of the numerous military hospitals. Many, if not most, of these possessed no knowledge whatever of roentgen ray technique prior to their entry into the army training schools. After the war no doubt many of these laymen will try to establish roentgen ray "practices" on their own account. As a British writer on this subject has said, these persons will serve a useful purpose as assistants to roentgenologists and electro-therapeutists, but they should be made to understand clearly that their training and experience as assistants in roentgen ray departments no more qualifies them to undertake the diagnostic and therapeutic phases of the work than the experience gained during the war by a private in an engineering regiment warrants him in setting himself up as a consulting engineer. It should be constantly borne in mind that in the roentgen rays we deal with a potent means capable of doing great damage when unskillfully employed. Our contemporary believes the fact that sterility can be brought about by their agency is sufficient in itself to warrant the passage of laws preventing their use except by qualified persons.

The sentiments voiced by our friends across the water find a responsive chord in the hearts of many American roentgenologists, who have been idle witnesses of the growth of a rather wide-spread evil, the commercial roentgen ray laboratory, previously commented upon in these columns. The editor believes that the increasing familiarity of the best physicians and surgeons of this country with the value of roentgen ray work, has created a strong disposition in favor of scientific roentgenology. But this disposition is not universal and is not alone sufficient to solve the problem just presented. The trained medical roentgenologist needs the protection of wise legislation no less than does the physician or surgeon. Even veterinarians and barbers are, in many states, legally protected against the exercise of their professions by untrained men. Surely medical men trained in roentgenology and engaged in one of the most highly specialized branches of scientific work should be adequately protected by law. The protection of such men is the protection of the sick public from both ignorance and deception and from unnecessary or harmful operations, or other treatment, which rest upon mistaken diagnoses.

The American Roentgen Ray Society will doubtless have the aid of the Medico-legal Committee of the American Medical Association in the effort to secure proper laws regulating the practice of roentgenology in the United States.

J. T. C.

Group-Study Valuation of the Roentgen Ray

Two years ago, the diagnostic section of St. Luke's Hospital, San Francisco, established what is termed the group-study method for clinical investigation. Patients who are chronically ill and have shown no tendency toward spontaneous improvement are sent to the hospital by their own physicians for investigation. They are then examined by twelve clinicians representing the following departments: pathology, bacteriology, roentgenology, eye, ear, nose and throat, cardiovascular diseases, respiratory diseases, gastro-enterology, urologic surgery, neurology, orthopedic surgery, general surgery and general medicine.

In the December, 1917, number of the Journal will be found a notable article by Walter Howard Hill, M.D., giving the results of this group-study in "The Analysis of the Cases in Four Hundred Dyspeptic Patients Especially from a Roentgenologic Standpoint." Dr. R. L. Ochsner,[1] in *Medicine and Surgery*, St. Louis, similarly has

[1] "Relative Value of Five Diagnostic Procedures in Four Hundred Consecutive Cases Investigated by the Group-Study Method for Pulmonary Tuberculosis." *Medicine and Surgery*, St. Louis, Nov. 1, 1917. No. 9.

given the results of this same group-study applied to cases of pulmonary tuberculosis. He gives first place to the physical examination, second to the history of the case, third to the tuberculin reaction, fourth to the roentgen ray and fifth to the examination of the sputum. He states that the roentgen ray gives no positive data in nearly 50% of the cases, is of less value than the tuberculin test and is useless excepting in a negative sense until extensive pathologic changes have taken place, long after the symptomatology and the physical signs are well marked.

This plan of group study is splendidly conceived and it is clear that the published results will exert a far-reaching influence on the medical profession. It is no less clear that an able, aggressive and biased clinician in one department, as for example that of the respiratory diseases, may completely upset true relative values. To classify the roentgen ray examination of the chest as inferior to the tuberculin reaction is too much of a joke to be seriously argued.

Roentgen ray battles that have been fought and won must, it seems, be fought and won many times over before our true place in clinical medicine is universally acknowledged.

A. W. C.

The Liberty Loan

Roentgenologists are a deeply patriotic class as shown by the large proportion in uniform. Those who have not volunteered are withheld, almost without exception, by reasons of family dependencies. They are as a class no less patriotic than their *confrères* with bars or oak leaves on their shoulders. If they cannot mobilize in person they can and will mobilize their dollars. If they cannot serve in the first line of defense they can and must form the reserve from which later armies will be supplied when still greater sacrifices are required. In the interim they are in many cases serving their country without rank or pay on Medical Advisory Boards in helping to recruit an army that will be first in health, first in strength and first in the hearts of their countrymen.

The Liberty Loan is an investment, not a sacrifice. It places your money directly in the hands of your Government to be used in your defense and to be paid back with liberal interest. There is no possibility of loss, because this country can never be conquered.

The empire of the Cæsars held the world in yoke for a thousand years. Generations lived and died in what they thought was the permanent government of mankind. We have dedicated, as a nation, all that we have and all that we are to the unswerving purpose of preventing the German Kaisers from fastening the yoke of a similar empire upon a prostrate world. If we are to make good as a nation we must as individuals be ready to give our lives and our fortunes to this cause. But we are asked merely to loan a certain proportion of our income—in other words to buy Liberty Bonds—a test of patriotism to which even the weakest can respond in some measure, and yet in the aggregate a test of such tremendous importance that the fortunes of the world's war hang in the balance.

But we cannot fail. McAdoo like Hamilton twice smote the rock of public credit and abundant revenues gushed forth. The springs of national confidence are exhaustless and again full measure is assured; Every cent of these loans is a bulwark of national security and a safeguard for generations yet unborn. It is no less true today than in the days of Franklin that we must hang together or we will hang separately. When democracy shall have been made safe among the nations of the earth then and not till then let the last loan be written.

A. W. C.

TRANSLATIONS & ABSTRACTS

LINDSEY, JOHN H. Roentgenological Control after Pylorectomy for Ulcer. (*Boston Med. and Surg. Jour.*, Vol. CLXXVI, No. 31, Jan. 18, 1917, p. 80.)

Lindsey presents a series of 18 roentgenograms made at varying periods after pylorectomy for ulcer, performed in the Truesdale Clinic. He believes these plates to have intrinsic merit and also to be of special importance as representing a roentgenological follow-up of patients for long periods after operation.

While it is difficult to standardize the condition of patients at repeated gastric roentgen examinations, there is *prima facie* evidence in this series of plates that the stomach, after pylorectomy, tends to enlarge or dilate, and thus compensates for the part removed at operation. In some cases, where a wide resection had been performed, the stomach does not seem to have much opportunity to dilate. In one case, for instance, a very rapid emptying of the stomach is shown. This plate was made soon after the administration of barium buttermilk. The stomach in this case acts very much like a funnel which merely directs the liquid meal into the intestine. The meal does not stay in the stomach long enough to produce a tension which would cause dilatation.

From the clinical information given the roentgenologist, all of these patients with the exception of two seemed in good condition. In general, the efficient manner in which these stomachs have performed their function at long periods after operation testifies to the essential conservatism of an apparently radical operation.

WARNEKROS. Value of the Roentgen Ray in the Prevention of Recurrence after Cancer Operation. (*Zentralbl. f. Gyn.*, Nov. 4, 1916. Ref. *Med. Rec.*, Jan. 6, 1917, p. 26.)

Warnekros places on record the work of four years in the Berlin Clinic. During the period from 1911 to 1914, 174 cases of cancer of the uterus were temporarily arrested or actually cured with the knife. Of this number 119 patients were not submitted to post-operative raying and 66 of these died of recurrence, while 2 others have disappeared. The remaining 55 have thus far been free from recurrence, but the interval is much too brief to speak of end results. It may therefore simply be stated that the recurrences amount to 55.4 per cent. There were 55 women who have been systematically rayed since operation, and of this number but 11 died of recurrence, while 44 are alive and well. Deaths from recurrence are but 18.5 per cent or almost one-third of the corresponding figure in the first series. Of the 55 women who were roentgenized after operation, 31 received radium in addition. This was applied in the vaginal stump and at times in the rectum. The rays were used both percutaneously and vaginally. In the entire material treated there were but ten cases of cancer of the uterine body.

JACKSON, CHEVALIER. Bronchiectasis and Bronchiectatic Symptoms Due to Foreign Bodies. (*Pennsylvania Med. Jour.*, Aug., 1915.)

While admitting he may be biased, the author can not but feel that the relatively minor place attributed by medical literature to foreign bodies as a cause of bronchiectasis is an error. Be this as it may, he cites a number of cases which prove conclusively that no case of bronchiectasis should be treated without considering the possibility of the presence of a foreign body.

Undoubtedly bronchial stenosis from whatever cause it may arise may produce a bronchiectasis and there are a few cases recorded that seem to prove that the bronchoscopic dilatation of a stenosis may cure a bronchiectasis. On this point further observation is required. At any rate the cases cited will indicate the necessity for bronchoscopy and roentgenography in all cases with symptoms of bronchiectasis.

The author expresses appreciation of roentgenological help rendered by Dr. George C. Johnston, and concludes by urging that every case of bronchiectasis, chronic bronchitis, pulmonary tuberculosis, pulmonary abscess, and chronic cough should have a roentgenogram taken, regardless of how certain we may be of

our diagnosis. In all cases with a foreign body history, in which the foreign body is one not dense to the ray, roentgenograms should be made anyway, and in most cases a bronchoscopy should be done also.

FISCHER, J. F., AND KNUDSEN, K. A. The Shape of the Vertebral Column in Different Positions, Illustrated by Roentgenograms. (*Nord. Med. Arkiv*, 1916, XLIX (Kirurgi), Afd., h. 4, S. 1–19 (29 figs.). Ref. *Review of Neurology & Psychiatry*, January, 1917.)

The movements of the vertebral column that carry the head from a good carriage of the body to a bad one, and vice versa, take place above all in the thoracic part, and especially in its central portion. As it is not possible, by asking people to contract the extensors of their backs, to give them an idea of what they are to do, and as the request that they should straighten their backs will only result in a carrying of the upper part of the trunk backward by bending the loin, it is important to realize that by asking them to lift their heads with the chin drawn in, the thoracic part of the vertebral column will be straightened.

The intercostal spaces are increased when the bending of the thoracic part of the vertebral column is diminished. The thoracic part of the vertebral column is relatively movable when it is a question of the increase of the convexity backward from the normal position, but very slightly movable when it comes to diminishing this convexity, especially in the central portion.

Voluntary bending sideways of the thoracic part of the vertebral column is possible. The ribs are lifted when the arms are carried in extended position backward, which, no doubt, is due to the fact that the pectoral muscles are greatly stretched by this position.

SIMPSON, FRANK E. Radium in the Treatment of Cancer and Various Other Diseases of the Skin. (*Jour. Am. Med. Assn.*, Vol. LXVII, No. 21, Nov. 18, 1916, p. 1508.)

Roentgen rays are described by the author as a splendid "selective" but, in general, a poor "destructive" agent when good cosmetic effects are desired, because of the dangers and uncertainties of the repair of the tissues. Radium, on the other hand, is not only a useful "selective" but also a "destructive" agent, and it is the latter property that constitutes one of its important uses because of the ease of its employment and the elegance of the reparative tissue. But it requires long experience before the full value of the destructive effects can be utilized.

In certain diseases, radium and roentgen rays may be regarded as alternative agents, while often the combination of both is desirable. In some diseases, roentgen rays are much more convenient and efficient, while in a certain restricted and peculiar field of dermatology radium holds an absolutely unique position.

Among the diseases in which radium has been found of value are: cancer of the skin, cancer of the mucous membranes, vascular nevi (birth marks), keloid, verrucous tuberculosis of the skin, lupus erythematosus, sycosis vulgaris, lichen of the skin, pruritus.

The author has treated over 200 cases of cancer of the skin, and failure to bring about recovery has been rare. Failure occurs, as a rule, only in the very extensive cases. When these, as is often the case, have been previously treated by other methods, the loss of tissue is so extensive that repair is almost impossible. Depending upon the disposition of the radium tubes (50 milligram or more) and the screening employed, healing of very sensitive epithelioma may be brought about in from three to twenty or more hours. With larger quantities of radium, however, it is very important not to produce severe reactions or burns, as these are likely to be very painful and slow of healing.

In the radium treatment of epithelioma of the mucous membranes, the results range from brilliant to disappointing. Metastases are a great source of trouble, and there is also the technical difficulty of holding the tubes in place. The author has devised a number of simple appliances for the purpose of meeting this difficulty.

In certain types of vascular nevi, radium treatment is far in advance of other methods. The application is painless, and the cosmetic appearance often excellent. At the same time, the author admits that in selected cases radium may with advantage be replaced or supplemented by electrolysis, carbon dioxid snow or the Kromayer lamp.

In the treatment of keloid, radium yields

excellent results, while for lupus the caustic effect of radium must be evoked. In verrucous tuberculosis of the skin the destructive action of radium is usually excellent. In lupus erythematosus, relapses may occur, but with persistent treatment the final result is often favorable. Radium here often succeeds in cases where other measures have failed. The same remark refers to sycosis, but the author emphasizes the necessity of very careful handling. Lichen usually yields to several ten-minute exposures with unscreened quarter strength. Localized pruritus (of the anus, etc.) is often relieved by radium, especially where no local lesions can be found to invite other treatment. In external location of pruritus ani, five to ten-minute exposures with the unscreened varnish apparatus are often successful, while within the anus the author employs 25 to 50 milligram tubes, screened with 0.5 mm of silver, three or four exposures being given of fifteen to twenty minutes' duration—usually with great relief and sometimes with recovery after one or two courses of treatment.

ORDWAY, THOMAS. Remissions in Leukemia Produced by Radium in Cases Completely Resistant to *X*-Ray and Benzol Treatment. (*Boston Medical and Surgical Journal*, Vol. CLXXVI, No. 14, April 5, 1917, p. 490.)

Those who have had extensive personal experience with and opportunity for intensive study of leukemia recognize that there have been cases which did not respond to treatment by the roentgen ray or benzol. Indeed, following the use of benzol, serious, even fatal, results have been reported, and toxic symptoms also may occur after the use of the roentgen ray. In certain instances benzol may cause a short period of temporary improvement, followed by rapid fatal termination. Such termination may also occur with other forms of treatment or without treatment. With the more recent improvements in roentgen apparatus by Coolidge and his co-workers, and by perfection in the technic of clinical application, it is probable that the number of cases which are refractory to the *x*-rays will be considerably lessened.

Renon, Degrais and Tournemelle in an admirable article add a sixth case of leukemia to the five already reported by them. They also refer to the French series of twelve cases of leukemia in which marked improvement resulted from the surface application of radium over the enlarged spleen. Eight of these had already been treated with roentgen rays with no advantage or only with temporary improvement. Pinch, of the Radium Institute of London, also makes reference to a case of myelogenous leukemia in which the results of radium treatment were excellent. Van Noorden and Falta did not obtain any favorable results in leukemia by the use of radium emanation even by prolonged treatment in the emanatorium. Falta, Kriser and Zehner, however, produced remissions in leukemia by the injection of the thorium-X. In the small series of cases reported by them, the immediate results were good, but the cases had been followed only a very short time, so that they did not draw any conclusions regarding end results of this treatment. German investigators have reported conflicting results from treatment of leukemia by thorium-X.

The principles of cross-fire as well as roentgenotherapy are made use of in the treatment of leukemia by surface applications of radium. The technic of such radium therapy may be illustrated by the striking effect of radium when applied in the proper manner to the surface over the enlarged spleen in cases of myelogenous leukemia. For this the following details have been elaborated:

The area of the enlarged spleen is carefully and plainly marked out with skin pencil or grease paint (of red or black color), the outline being obtained by percussion and palpation. The various landma ks, such as costal margins, anterior superior spine and crest of the ilia, the symphysis pubis and the umbilicus are marked. The patient is photographed in an erect position in both front and side views. A series of small squares 3 cm in diameter, when the radium applicator is 2 cm in diameter, are marked over the area of the enlarged spleen. It is important not to have the successive application areas too near together, or the skin between them will be "burned" by the double dose. The squares thus marked out are numbered serially. A swath of thin cotton cloth is carefully fitted to the abdomen, and the outline of the spleen, bony landmarks and small squares is traced upon it. This swath must be smoothly and accurately fitted and kept in accurate position by means of the

landmarks above mentioned, for it is left in place during each single series of treatments. The purpose of this swath is to avoid the irritation of repeatedly applying and removing the adhesive plaster which holds the radium applicator in place, for it has been found that the area which is being, or has been, radiated is particularly sensitive to injury from the repeated application and removing of adhesive plaster. Indeed, such added irritation may induce vesiculation or even superficial ulceration of the skin. Tracings of the areas and landmarks marked on the swath are now made on tracing cloth, which serves as a chart for guidance in the following series of treatments. With the chart as a guide, the radium applicator, screened with 2 or 3 millimeters of lead, 15 to 20 thicknesses of filter paper, and wrapped in gauze, is now applied to each of the squares in the order indicated. It is necessary also to add at least as much filtration and protection to the external side of the applicator, for the patient may inadvertently rest the arm or leg on the applicator during sleep, and a severe burn may thus result. The filter paper is applied to avoid the irritating effect of the secondary rays from the lead, and the gauze adds to the comfort of the patient.

After four to six weeks a second series of treatments is usually necessary, the interval between being determined by examinations of the blood and by the local condition of the skin. If the details here described are followed, however, no effect will be produced upon the skin other than very faint pigmentation after several series of radium treatments.

When from 50 to 60 milligrams of radium element or millicuries of radium emanation are employed, evenly distributed over a surface applicator 2 x 2 cm in diameter, and the filtration and protection above mentioned is used, the radium may be left in each position from 4 to 6 hours—4 hours if there are 60 milligrams, 6 hours if there are 50 milligrams and if the filtration is 3 millimeters of lead. With this amount of radium and the above technic, it is possible for complete remission in leukemia to occur with three series of treatments. Amounts of radium, however, as small as 25 milligrams, even when this is in the form of a tube, have reduced the spleen to normal size, and caused the characteristic improvement in the blood and in the general condition of the patient, but the time required is longer and the series of applications more numerous.

The author believes that in practical radiotherapy, radioactive substances will in certain instances doubtless be preferable to the use of the roentgen rays, particularly when there is a necessity for the most precise localization, especially within the body or in cavities difficult of access and also when the condition of the patient or circumstances demand portability of the therapeutic agent for convenience or ease of treatment. The disadvantage of radium is its great expense for sufficient dosage. He deems that when sufficient clinical experience has been gained in the application of the recent advances in the production of highly penetrating homogeneous roentgen rays of great volume by Coolidge and his co-workers, supplemented by careful scientific study of the physiological effects, there will be in the majority of cases very little difference in the therapeutic value of the roentgen rays and radioactive substances. It seems possible that similar results to those now produced by radioactive substances may be brought about in a much shorter time by the roentgen ray when the desired quantity and quality of the radiation may be measured in a rational manner, so that the results obtained by one man may be compared with those of others and that there may be a repetition of results from day to day. From the preceding it will be seen that each source of radiation has certain advantages, as well as disadvantages. Unless in the near future the cost of production and the selling price of radium are greatly reduced, it would seem, with the recent development in roentgen technic, that the latter will become of more general use in the treatment of many diseases.

A case report is cited at great length.

PFENDER, CHARLES A. Roentgenotherapy in Inoperable Carcinoma. (*Medicine and Surgery*, Vol. I, No. 2, April, 1917, p. 117.)

Deep roentgen therapy, the massive administration of 10 to 50 X Kienboeck units through 1 to 4 mm of aluminum and several layers of chamois or a thick piece of leather, in the hands of an experienced roentgenologist, is, in Pfender's experience, a perfectly safe procedure,

but it would be hazardous to establish a routine and apply it irrespective of the case in hand. The author describes three cases of inoperable carcinoma which are usually classified as "hopeless," with the following results:

The first patient, having an inoperable uterine carcinoma, is entirely well to-day (after about 18 months); the second patient, having inoperable secondary carcinoma of the chest and left lung, died from exhaustion after enjoying a respite of at least three months of life without suffering; and the third patient, with an inoperable post-operative metastatic carcinosis of the head, chest and sacrum, was symptomatically well for eight months with prospect of further improvement, had she continued treatment.

PRIME, FREDERICK. Observations upon the Effects of Radium on Tissue Growth in Vitro. (*The Journal of Cancer Research*, Vol. II, No. 2, April, 1917, p. 107.)

During the last few years much has been written both for and against the usefulness of radium as a therapeutic agent in the treatment of malignant growths. The observations along this line have been chiefly clinical, made, that is, upon tumors in man, where it was impossible to control the results with any degree of accuracy. The employment of in vitro cultures of cells growing in plasma offers a convenient method for observing growing tissue, and this, therefore, was chosen as the most suitable means for studying the changes produced by radium upon the individual cells.

The author refers to the work of Wedd and Russ, Wassermann, Price Jones and Mottram, all of these authors having made experiments upon tissue in vitro. The author's experiments were first conducted on the embryo chick heart kept alive for a long period by the method set forth by Carrel. Hearts were removed from chicks which had been incubated for from five to seven days, cut into small pieces about 0.001 gram in weight, and some two or three dozen such fragments suspended in a hanging drop of Ringer's solution on a cover slip sealed with paraffin over a hollow slide. The cultures to be treated with radium were then covered with 0.4 mm of brass, upon which the radium tubes were placed, and thus exposed to the action of 100 mgm of radium for one-half and two hours respectively. In a previous series of experiments it had been found that the lethal point of small pieces of tissue where the unfiltered rays were concerned was twenty, fifteen, and ten minutes for 17, 83, and 100 mgm of radium, respectively. When the alpha and soft beta rays were removed by filtration with 0.4 mm of brass, three hours, one hour, and forty-five minutes, respectively, were required for 17, 83, and 100 mgm to kill; whereas when only the gamma and secondary beta rays were employed, twenty hours were necessary for 17 mgm of radium, and about seven hours for both the 83 and 100 mgm to cause death.

The two exposures to 100 mgm of radium mentioned above for one-half and two hours when both beta and gamma rays were used was therefore a sublethal and a lethal dose, respectively. After exposure, each piece of tissue was removed from the Ringer's solution, and cultures of them were made in slightly diluted chicken plasma, controls being accorded the same treatment in all cases. The cultures were all kept in an incubator at 37° C., and daily observations made as to their condition.

The author concludes the article as follows:

1. Radium in sufficiently large doses will so injure the nucleus of the cell as to prevent further mitosis.

2. This injury to the mitotic power of the cell does not, however, prevent a marked increase in the area of the culture due to an outwandering of cells.

3. This power of the radiumized cells to wander out from the main tissue is limited, extending through two or at most three generations.

4. When there is a marked outwandering of cells after radiumization, but no mitosis, the tissue will not grow when inoculated into mice.

5. Radium does not, therefore, kill the cells outright, as is shown by the persistence of beating in heart muscle cells, but injures the nucleus in such a manner as to prevent further division, which must eventually result in the death of the cell, if its energy is expended in growth and division and not in a purely mechanical function. The well-known high resistance to radium of the cells of the central nervous system, which do not divide in adult life, is presumably correlated with the survival of the heart muscle cells after lethal exposures.

6. The stimulating effects of minimal doses

of radium are shown by the profuse outwandering of the cells which occurs after sublethal exposures.

TOUSEY, SINCLAIR. Prevention and Treatment of Cancer Based Upon *X*-Ray Findings of Dental Infection and the Use of Autogenous Vaccine. (*N. Y. Med. Jour.*, Vol. CV, No. 11, March 17, 1917, p. 485.)

The title of this paper raises hopes too good to be true, and the contents bear out the apprehension that the hopes are premature and the title misleading. Dr. Tousey throws out the suggestion that defective teeth may be the underlying cause of cancer, because a number of cancer patients have been found to be so inflicted. Tentative treatment with autogenous vaccine prepared from the infected areas has also been instituted. The object of the communication is, according to Dr. Tousey's frank avowal, to put in a claim for priority in case further investigations by himself and others should bear out the correctness of his suggestions. It is just possible, however, that the profession will prefer to give credit to those men who establish facts and make a practical success of ideas rather than bestow eulogies upon claims for priority before the object is accomplished.

RATERA, J. AND S. Roentgenotherapy for Tuberculous Glands. (*Siglo Medico, Madrid*, July 21, 1917. Ref. *Jour. Am. Med. Assoc.*, Sep. 8, 1917, p. 856.)

The authors have treated thirty patients with tuberculous glands by exposure to the roentgen rays and have been impressed by the prompt cures effected. They declare that it is so effectual that it can be relied upon to differentiate ordinary tuberculous glands from Hodgkin's disease, as in their five cases of the latter not the slightest benefit was apparent. It even seemed in some of the cases as if the disease had been whipped up by the exposures.

BARRINGER, B. S. Report of Four Cases of Carcinoma of the Bladder Locally Removed by Radium. (*Am. J. Surg.*, Vol. XXXI, No. 12, December, 1917, p. 325.)

In a large majority of cases in which the author has applied radium to bladder tumors, the hematuria has stopped two or three days after the irradiation. There is a suggestion in this that the primary effect of the radium is upon the blood vessels. If this is so it would in a measure explain why papillomata of the bladder, rich in blood vessels, react somewhat more slowly to radium than true carcinomata which have poor and imperfectly developed blood vessels.

In some cases the rapidity of the action of radium is astonishing. In one case, which was irradiated January 19th, on February 4th, (sixteen days later) cystoscopy showed that an extensive carcinoma had entirely disappeared.

Radium burns of normal portions of the bladder have occurred only in those cases in which carcinoma was around the bladder neck, and in which the radium was pulled into the urethra and kept there for a long time. The author has had two such cases. The burns last a long time, and cause considerable irritation. Division of the radium dose into two or more tubes; use of smaller quantities; change in the position of the patient during application; and a fairly long interval between irradiations—six weeks or more—ought to prevent such burns.

The four cases reported are selected from some twenty-five cases of carcinoma of the bladder which have been, or are being, treated by radium. The author believes them interesting because they probably all fall into that class of bladder carcinomata which is most malignant.

COLE, L. G. Ileocecal Incompetency. (*Med. Clin. No. Am.*, Vol. I, No. 3, November, 1917, p. 689.)

The author discusses what he considers the direct causes, constitutional symptoms and clinical significance of ileocecal incompetency.

Cole considers some of the direct causes are pregnancy and its sequelæ, chronic appendicitis with adhesions, post-operative adhesions, pericolonic veils or Jackson's membrane.

The constitutional symptoms are due to the ileal absorption of putrid colonic contents; and a failure to repair the incompetent valve ultimately forces the terminal ileum to assume a colonic function. The rich lymphatic supply of the ileum makes it ill suited for this function, as there will result an absorption of putrefying material.

Under symptoms, the author mentions pain resembling gallbladder or urinary colic and a tumor mass in the right iliac fossa. The constitutional symptoms are varied, sometimes evidenced by localized pains to the left of the umbilicus accompanied by flatulence and constipation. Periodicity is one of the most prevalent symptoms. The relation between ileocecal incompetency and spasmodic or other functional lesions of the stomach is mentioned.

The author has advised operative procedure for a number of his cases, the technic recommended following closely that described by Kellogg. The results have been gratifying; and subsequent roentgen ray study has shown that in very few cases where the valve was properly repaired was the valve found incompetent. He states that if the valve is properly repaired, the results are permanent.

GIFFIN, HERBERT Z. Treatment of Myelocytic Leukemia by Radium. (*Boston M. & S. J.*, November 15, 1917, p. 686.)

The author reports a series of 30 consecutive cases which have been treated by means of surface application of radium element over the spleen.

In some instances in this series the author used 50 mg. and in others 100 mg. of the radium element in tubes. The enlarged spleen was mapped out into squares in the manner described by Ordway, and the radium exposed over each area for periods of three or four hours. The total length of time for each series of applications varied from twelve to forty-eight hours; usually, however, the time was from twenty-four to thirty-six hours. Patients remained in bed during exposure. In the early cases the protection consisted only of 2 mm. of lead beneath the radium and 2 mm. of lead over the radium. The radium was held in place by means of adhesive plaster. Superficial burns resulted, but they were never serious and healed without difficulty. As previously pointed out by Ordway, experience demonstrated that the skin formerly traumatized by adhesive plaster was especially susceptible to burn. After adding 1.2 inch of wool beneath the 2 mm. of lead equally satisfactory results were obtained, with only occasionally a slight burn. The radium may be raised so far from the skin by means of gauze that little result is obtained from the exposures. When a satisfactory response does not occur, one should reduce the protection, even to the point of burning the patient.

Dr. W. J. Tucker devised a biscuit-shaped block which has been used routinely for several months. This consists of ½ inch of wood, 2 mm. of lead, ½ inch of wood bored to receive the tubes of radium, and above this 2 mm. of lead and another ½ inch of wood. This block is held in position by means of a simple canvas belt. An endeavor is made to concentrate the fire through the most massive portions of the spleen.

A certain degree of general improvement, together with reduction of the size of the spleen and of the leukocytic count, occurred in every instance, even in the most advanced and toxic cases. Marked temporary improvement occurred in 26 patients, and a remarkable improvement in 13. It is impossible satisfactorily to discuss the subsequent histories of these cases at this time.

Hemorrhage ceased as a rule after one or two series of exposures. In two instances, hemorrhage occurred after radium exposures when it had not occurred previous to treatment. In these instances the hemorrhage seemed to be the result of over-exposure; an anemia also developed; both the hemorrhage and the anemia were successfully combated by means of transfusion.

In 25 patients there was definite improvement of the anemia concomitant with the improvement of the general condition. The reduction of the number of leukocytes was due chiefly to not only an absolute but also a striking relative fall in the myelocytes; there was a striking fall in the absolute count of polynuclears, while their relative percentage remained approximately the same. There was also a marked fall in the absolute count of small lymphocytes.

Surface exposures of radium over the spleen of myelocytic leukemia usually affect a very rapid reduction of the size of the spleen, a fall in the leukocyte count, and improvement in the general condition. Together with transfusion, they constitute at present the most effective temporary measure in the treatment of the disease.

HOLLAND, ARTHUR L. Fluoroscopic Method of Diagnosis in Disease. (*Med. Clin. No. Am.*, Vol. I, No. 3, p. 767, November, 1917.)

The author holds that the fluoroscope is an instrument of medical diagnosis and that it

should be used only by those who are actually engaged in clinical medicine and are experienced, or at least familiar with modern laboratory methods. The field for fluoroscopy is a large one; it overlaps that of roentgenography, but does not substitute for the latter method.

The fluoroscope in trained hands will yield information that roentgen ray plates, even in long, expensive series, cannot always disclose. This information is: A correct estimation of peristalsis or the presence of a reversed peristalsis; the effect of adhesions on the position, contour, mobility, motility and relation of the viscera; the possibility of direct dermatographic charting; the better placing of mass and pressure pain with combined palpation; and the detection and estimation of spasm. Roentgen ray plates in series may suggest these possibilities, but only when interpreted by a master roentgenologist.

On the other hand, the fluoroscope cannot compete with serial roentgenography in: The detection of obscure filling defects in the duodenal bulb, pyloric region, and the intestines; the outlining of diseased gallbladders; the detection of gall or kidney stones; and the accurate mapping out of a diseased area as an aid to the surgeon in determining his mode of procedure. Then, too, the obese patient presents a problem to the fluoroscopist which is not nearly so perplexing when plates are used.

When in routine diagnosis the fluoroscopic findings are at variance with clinical and laboratory findings and a diagnosis remains cloudy, supplementary roentgenography should be employed. Operative cases should be studied by a combination of both methods prior to operation.

This excellent article is apparently written by a man who has not had large laboratory training in roentgen ray work, if one may judge by Fig. 71, showing a patient being fluoroscoped in the horizontal position. Although the author urges that every possible protection be insisted upon, and that the roentgenologist wear a leaded rubber apron, the observer in this figure is sitting on the edge of the table on which the patient is being examined. This rather comfortable looking position reverses the logic for the use of the rubber apron. If the observer wishes to maintain this position he should *sit* on the apron instead of wearing it. This, however, is a minor detail. The author is to be complimented on the very logical and lucid discussion of the subject undertaken.

At the close of the article, the author refers to stereoscopic fluoroscopy, but no credit is given to our colleague, Dr. E. W. Caldwell of New York, the father of stereoscopic fluoroscopy, whose tireless efforts in the experimental field are alone responsible for the early prospect of realizing this "dream of roentgenologists."

KOUWER, B. J. Roentgenotherapy in Gynecology. (*Nederlandsch Tijdschrift voor Geneeskunde*, Amsterdam, Sept. 8, 1917, II, No. 10. Ref. *J. Am. Med. Ass.* Dec. 8, 1917.)

Kouwer warns that roentgenotherapy for fibroma of the uterus is still in the tentative stage. Opinions are still divided as to whether the fibroma itself or the ovaries should be exposed. He warns further that our assumption as to the two separate functions of the ovary—the production of the ovum and of the internal secretion—is still purely hypothetical. But we have reason to assume that roentgen exposures carried far enough are equivalent to castration, and we do not know the damage that may be wrought by the exposures even stopping considerably short of this. Instances have come to his knowledge in which roentgenotherapy has been applied to young women to relieve dysmenorrhea, and even women of 35 and 40 are not excluded from roentgenotherapy by those who fail to appreciate the power of the roentgen rays acting in this region. The gynecologists have not failed to warn of the dangers from operations, and the majority refrain on principle from operating for uterine fibroma unless very serious indications call for it. But, he adds, the roentgenologists are not equally frank in regard to dangers from roentgenotherapy. The medical literature of the Netherlands has no reports of injury of patients from roentgen treatment. He knows that such cases exist, but where are the reports of them? In referring to the Freiburg method of abrupt and very powerful application of the rays, he says that it is not difficult to learn from the very reports of their 1,395 cases sent out by the Freiburg clinic the harm done in this or that case. "How does it happen," he exclaims, "that Freiburg is deaf and blind to them? How can it be explained

that, nevertheless, the statements of Konig and Gauss are accepted by many as absolute authority?"

MacKee, Geo. M. *X*-ray and Radium in the Treatment of Skin Diseases in Children. (*Tr. N. York Acad. M.*, Section on Pediatrics, *Am. J. Obst.*, Dec., 1917.)

We quote the following remarks by Dr. MacKee on the above subject: "I am limited to a discussion of the results of the *x*-ray and radium in the treatment of dermatoses in infancy and childhood and this confines my remarks to very narrow limits as there are not very many skin diseases peculiar to infancy and not many more in children that are amenable to treatment by the *x*-ray and radium. One of the conditions frequently met with by the pediatrician and one in which roentgenology has given good results is favus or ringworm. This is a condition which has given much trouble in different parts of the world. It is much more difficult to treat in early life than when it occurs near the time of puberty. It has been almost eradicated in London and other European cities by the use of the *x*-ray, and it seems a pity that we have not employed this method more generally in the United States. Children with ringworm are not allowed to go to school but they mingle with others on the streets and are therefore a menace. As a result they never receive a school education. I believe that Dr. Fordyce's clinic is the only free institution in this city where this method of treatment is being employed, but every hospital and dispensary should be similarly equipped; it can be given by a nurse under supervision. It is possible where there is only a single lesion to treat merely the diseased area. It is not always necessary to depilate the entire scalp. When depilation occurs, care must be taken that the hairs which fall out do not become scattered and spread the infection. To avoid this among intelligent people the lesion may be covered with zinc plaster after the treatment. As the hair falls out three weeks after the treatment, by removing the plaster at that time the hair will be found adherent to it. In the treatment of this condition by the *x*-ray the dosage must be very accurately measured. It takes a certain amount of *x*-ray to make the hair come out and a very little more to prevent its ever coming in again, so that the limits of the dosage are not very wide. We have treated 300 or more cases, three different men giving the treatment, and we have had no instance of permanent alopecia. It is evident that in applying the *x*-ray to the skull all points of the skull are not equally distant from the focus, and that the oblique rays will be less powerful than the direct rays. To overcome this discrepancy Adamson devised the method of mapping the skull into five areas and applying the *x*-ray to each of these successively. We have used no protection for the scalp but have protected the face, ears and neck. It takes from one half hour to forty-five minutes to treat the entire scalp and it is not necessary to treat all on the same day or to apply a full depilitating dose at one sitting; one may give a fractional part of the dose each day until the total dose is administered. If the correct dose is given the hair falls out in three weeks. There are a few contraindications. It cannot be used in very young children, but only because they cannot be kept still. A child of two or three years, however, may be treated very easily. The *x*-ray must not be applied to the scalp for three weeks after the application of irritating chemicals and such chemicals must not be used for several weeks after the *x*-ray has been employed. If the *x*-ray has been applied at such a time a permanent depilation may result. Sometimes it is not necessary to obtain complete depilation as the diseased hairs may fall out under very small doses, and if we only get a partial depilation of the affected area we will often effect a cure.

"Blastomycosis and actinomycosis are conditions that respond well to *x*-ray treatment.

"In vascular nevi we get good results with radium, but not so good with the *x*-ray. Cavernous angiomata can be cured by the *x*-ray, but only by persistent treatment, and such persistent treatment is not advisable. It is apparently the beta rays of the radium to which the therapeutic results can probably be attributed. These are also present in the *x*-ray, but they cannot be used. The radium tube is not as satisfactory as the radium plaque because one gets a reticulate effect with the tube. The port-wine mark does not respond to *x*-ray or radium. Pigmented nevi do not do well under the *x*-ray or radium. Hairy nevi, on the other hand, respond well to the *x*-ray treatment.

"Acne likewise responds to *x*-ray treatment but it is not necessary nor is it advisable to resort to this unless the ordinary methods fail.

"Keloid occurs in infants and children usually as the result of burns and both *x*-ray and radium are very efficacious. All forms of keloid are amenable to such treatment.

"Of the different varieties of warts, the common wart, verruca vulgaris is very amenable to treatment by the *x*-ray or radium. One treatment with either of these agents will usually effect a cure. The small flat juvenile warts do not do so well under this form of treatment. Plantar warts, keratomata, which are not very satisfactorily treated by other methods, respond to this form of treatment and I have never known a case to relapse.

"Sarcoma in children is curable by this method if it is attacked sufficiently early. If a pigmented mole begins to develop into a sarcoma, it can be cured provided no metastasis has occurred. I have a picture of a case of melanosarcoma which was apparently cured by the *x*-ray five years ago. The patient had one relapse and was given further *x*-ray treatment, after which the cure appeared to be complete. I have had two or three other patients who have had no trouble after periods of three years.

"In speaking of eczema I do not wish to be understood as advocating the use of the *x*-ray as a routine method of treatment, but in squamous eczema it causes the lesion to disappear and it requires only small doses to produce this result. I would, however, use the *x*-ray in eczema only in obstinate cases that failed to respond to the ordinary methods of treatment.

"Psoriasis occurs frequently in children and is easy to treat by means of the *x*-ray and radium. Chrysarobin is, however, usually satisfactory. Radium and the *x*-ray are both effective but with radium one cannot treat as wide areas as with the *x*-ray.

"Lichen planus is a recalcitrant disease, but it usually responds to ordinary treatment. When it is limited to small areas the *x*-ray or radium is indicated.

"Lupus vulgaris of hypertrophic or ulcerative type yields well to treatment with the *x*-ray or radium. The atrophic type is very recalcitrant. The *x*-ray, if properly administered, gives very good results in tuberculous adenitis. Scrofuloderma may also be treated in this way successfully."

MONTGOMERY, DOUGLAS W., AND CULVER, GEORGE D. The Preoperative Reduction of Epithelioma by Roentgen Rays or Radium. (*J. Cutan. Dis.*, Vol. XXXV, No. 421, December, 1917, p. 837.)

A primary radiation with radium is now an accepted principle in the operative treatment of cancer in certain situations, as, for example, of the uterus including the cervix, of the vagina, of the rectum, of the tongue and even of the lips. This principle may be made use of in cancer of the skin, and by it in some cases the resulting scarring and deformity may be notably reduced, also cancers justly regarded as inoperable, may be brought well within the limits of more easy radiation.

The author, as an example of what may be obtained by employing the roentgen rays within the limitations in which they could be of benefit, reports an exceedingly interesting case of a man ninety-one years of age with an epitheliomatous ulcer occupying almost the entire left side of the nose.

It was impossible to curette the whole lesion, as the shock would probably have killed the patient. He was first given five roentgen ray exposures of thirty minutes each, from a medium tube at 4 inches distance, spread over a period of twenty-two days, after which there was a marked reaction with flattening of the edges of the lesion. By December 14, there was decided improvement, and on this day, the authors gave him another roentgen ray exposure of thirty minutes directed into the deep portion of the ulcer near the eye.

On December 20, it was possible to curette the area nearest the tip of the nose, after which we applied roentgen rays to the raw surface for thirty minutes, then swabbed it with the acid nitrate of mercury.

On December 28, the surface nearest the eye was treated in the same manner, a procedure that previously the authors would not have thought feasible.

By January 25, everything was healed but the upper part of the ulcer. On April 4, the authors had to curette this also, and on doing so came down on uncovered bone, and beside this there was a cushion-like ridge above the edge of the ulcer which was scraped away. The raw surface was exposed to the roentgen rays for thirty minutes, and then chromic acid crystals were poured on and pressed in.

The resulting crust came away the following month, and during May, June, July and August the authors gave in all 125 minutes of roentgen ray exposure in broken doses. In the meantime some small pieces of necrotic bone were exfoliated, and the lesion healed entirely, leaving a small hole leading into the nasal cavity.

At no time was the patient seriously incommoded by the treatment, and the pain occasioned by the procedures was obtunded to a bearable degree by infiltrations of weak cocaine solution.

Valuable as the roentgen rays are in the treatment of epithelioma of the skin there is also no doubt of the deceptive nature of a healing depending wholly on them. The theory of their action and of the action of radium in this disease is the same. As the young cells of the neoplasm divide, the rays strike them at this tender period of their development and kill them. When this theory is borne in mind, a prolonged moderate, rather than an intensive short, treatment with roentgen rays is preferable. It is possible that, because it is steadier and more prolonged, radium is better than roentgen rays in these forms of radiant energy, which are so alike in their therapeutic action. Nevertheless, from the very nature of things some cells may escape or be only inhibited.

RITCHIE, HARRY P. Duodenal Diverticula. (*J. Surg., Gynec. & Obst.*, Vol. XXV, No. 5, November, 1917, p. 485.)

The author, after reviewing the literature, finds reports of 76 cases, and in addition 10 cases reported by Case and one by Stewart as having been discovered roentgenologically. The author also refers to findings by Case, Carman and others of a sort of sacculation or pseudo-diverticulum which may arise from a duodenal ulcer scar.

The present case, which is reported in full with roentgenological, surgical and pathological findings is of special interest because the duodenal diverticulum occurred in association with duodenal ulcer.

The author reports the unusual features as follows:

1. The diverticulum was demonstrated at operation.
2. It was of unusual size, being the largest reported.
3. The position was in the first portion of the duodenum just below the pylorus.
4. It is the only case reported where a diverticulum was found in close proximity to an ulcer of the duodenal bulb.

(See case reported by Shoup, *Am. J. Roentgenol.*, November, 1917—Editor.) An extensive bibliography is quoted.

SIMMONS, CHANNING C., AND BENET, GEORGE. Hodgkin's Disease with Special Reference to *X*-Ray Treatment. (*Boston M. & S. J.*, Dec. 13, 1917, p. 819.)

The authors report a series of cases observed at the Huntington Memorial Hospital in Boston in connection with the work of the Cancer Commission of Harvard University. The report covers a period of three years and includes not only Hodgkin's disease but three cases which though clinically Hodgkin's disease, were lymphosarcoma.

The roentgenotherapy was conducted under the direction of Dr. Wm. Duane. 31 cases were diagnosed and treated as Hodgkin's disease, including three which proved on microscopical examination of the glands to be lymphosarcoma. For various reasons, 11 other cases were eliminated so that the report is based on 19 cases.

The radium has been used in the form of emanation, which is collected and sealed in a capillary tube. This in turn is enclosed in a small metal jacket. Each tube represents from 10 to 250 millicuries of emanation, the strength varying with the age of the tube. The tubes are applied to the patient with a 2 mm lead and 2 or 3 cm gauze screen, and are left in position from 1 to 12 hours. In a few instances the tubes have been inserted directly into the mass of glands. In the treatment of the mediastinal and other deeply situated glands, the tubes are raised 2 to 4 cm above the skin in order to obtain a maximum dose with less danger of burning the skin. Some skin reaction is very apt to appear in from one to two weeks. There may be a marked constitutional disturbance with nausea and vomiting, prostration and some fever following treatment with either radium or roentgen ray. These symptoms appear soon after exposure.

There were but 9 cases of Hodgkin's disease that have had sufficient treatment with radium

to allow of conclusions being drawn as to its value. What sufficient treatment is, is difficult to say. The cases received applications from one to three times a month over periods from three to twelve months, the usual t eatment being from 600 to 1000 or more millicurie hours. We are now using larger doses. In analyzing these nine cases, every one showed benefit by diminution in the size of the glands and improvement in the general condition. The first effects on the glands were noted in from nine days to three weeks, averaging two weeks.

There are in this series but five cases carefully treated with the roentgen ray where the dose is known. Four improved under treatment, and in all of them the improvement is noted as beginning about two weeks after the first treatment. In the fifth case there was no change noted in the size of the glands. All but one of the cases are now dead, and that one also received considerable radium.

The roentgen rays when measured were usually given at a distance of 25 cm through an aluminum filter, and with a brass cone. The voltage was 70 K. V.

The impression is that the patients improve in general condition, and that the glands treated diminish in size with the roentgen ray, but that the improvement is not as marked as with radium. The roentgen ray treatments were also directed against definite masses of glands, and no attempt was made to radiate all the lymphadenoid tissue of the body, as we believe should be done.

STEIN, OTTO J. A Case of Nasal Sarcoma Cured by Radium. (*N. Y. M. J.*, Vol. CVI, No. 23, Dec. 8, 1917, p. 1075.)

This article reports the case of a young man, age 20, with a diagnosis of nasal sarcoma involving the right antrum, ethmoid and nostril. Between September 25, 1916, and January 27, 1917, the patient received over 6000 milligram-hours of radium application, part of the time filtered through one to two millimeters of lead and part of the time through one millimeter of platinum and rubber.

Examination on April, 1917, gave no evidence of a tumor within the nasal pharyx. Some four or five weeks later, he was reported to be suffering from metastases and the family physician stated that the malignancy was manifested within the intestinal tract. About ten days later, the patient died. Postmortem was obtained and careful study made of the skull. No evidence of malignancy was found. Examination of the abdomen showed that death occurred from peritonitis caused by a ruptured appendix.

BOOK REVIEWS

THE MEDICAL CLINICS OF NORTH AMERICA, September, 1917, Vol. I, No. 2. Published by W. B. Saunders Co., Philadelphia.

It is satisfactory to note that the second number of this new publication has given some consideration to the claims of roentgenology upon the attention of clinicians, there being a contribution by Pancoast on the Diagnosis of Pulmonary Tuberculosis by the Roentgen Ray. There are 7 roentgen illustrations, numbered from 17 to 23, and it is a matter of speculation what has become of the preceding 16 roentgenograms. The illustrations embrace the bronchopneumonic type of pulmonary tuberculosis, hilus tuberculosis with infiltration into the lung, diffuse pneumonoconiosis, fibrosis resulting from pulmonary tuberculosis, from infection following inhalation of foreign body, from pneumonoconiosis and from "Potter's Asthma."

The complications of pulmonary tuberculosis that are subject to satisfactory roentgen study are mainly in the pleural cavity, comprising empyema and pneumothorax, and Pancoast thinks it needless to dwell upon the importance of a roentgen examination in these conditions. This is a strong standpoint which, we trust, will be duly pondered and heeded by the clinician.

The essence of Pancoast's paper is embodied in the following conclusions:

1. The characteristic roentgen feature of early pulmonary tuberculosis is the individual or conglomerate tubercle, when found in numbers. The appearance is usually typical of the disease, but not always.

2. From the roentgenologic standpoint early pulmonary tuberculosis may manifest itself in three ways, depending upon the anatomic distribution—the hilus region, peribronchial infiltration along the larger trunks, or infiltration in the parenchyma further remote from the larger subdivisions of the bronchial tree.

3. Fibrosis may result from tuberculosis, but when seen does not necessarily imply a tuberculous process.

4. A roentgenologic study of every case is not essential. Its greatest value is to determine the exact nature amd extent of the lesion when the diagnosis is certain and to assist in the diagnosis of doubtful cases.

5. The policy of treatment is largely to be determined clinically when the diagnosis is assured, although the frequent aid of the roentgen examination is not to be denied.

6. The best interests of the patients are served by coöperation between a competent clinician and roentgenologist.

RADIOGRAPHY AND RADIO-THERAPEUTICS. By Robert Knox, M.D. (Edin.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), Consulting radiologist, Great Northern Central Hospital, London; Hon. Radiographer, King's College Hospital, London; Director, Electrical and Radio-therapeutic Department, Cancer Hospital, London; Captain, R.A.-M.C. (T.) 4th London General Hospital (in charge of *x*-Ray Department). Part I. Radiography. With seventy-eight plates (one in color) and three hundred and thirty-seven illustrations in the text. New York: The Macmillan Company. London: A. & C. Black, Ltd. 1917. Pp. 382. Price, cloth, $9.00.

The very favorable impression made everywhere by the appearance of the first edition of this work is only accentuated by the second edition before us. This is the most comprehensive, understandable and generally reliable work on radiology which has appeared in the English language, and, as such, it should excite a feeling of pride in every member of our profession.

The author has taken advantage of the opportunities offered for a new edition to add much material of a military nature, such as ought to be very helpful to others at the present time. Twenty-four plates and one hundred and fifty illustrations have been added in the text, and the entire work revised and enlarged so that it is now being issued in two volumes, the first of which is before us.

Aside from very complete and authoritative discussions relating to the physical considerations of roentgen ray work, apparatus, and installations, and the diagnostic features of bone and joint work, there are comprehensive chapters on the examination of the thorax, the ex-

amination of the alimentary system, the study of the urinary tract, and a final chapter on congenital malformations.

The new material which especially interests us at the present time is that relating to the installation of military radiographic outfits and the methods employed in the localization and extraction of foreign bodies. The author combines his experience with that of his colleagues in the military service, and describes their ideal of equipments for base hospital work, the roentgen ray mobile outfit, the outfit for the collecting hospital or clearing station, and the field outfit.

The roentgen ray mobile outfit is a 2 or 3 ton lorry which has a 3 K.W. dynamo having an output of 20 amperes at 150 volts. The dynamo is driven from the main gear-box and is so arranged that it gives this output when running at normal engine speed. Behind the driver's seat is situated the photographic dark room, which is arranged with a seat for the operator, a developing tank on one side, and a printing desk on the other; it is also provided with ample water supply, with hot drying cupboard, ventilator, lead-lined cupboard, dark-room lamps and all the necessary fittings. Behind the dark room the remainder of the body is converted into either a store-room for apparatus (during transportation) to be used in the tent outside, or into a permanent dark room. This mobile outfit provides for a plant with a tent for use as an operating room.

The field outfit calls for a small but serviceable installation fitted up in a motor transport, the engine of which can be used to drive the dynamo which generates the electricity. The whole apparatus can be fitted up in a motor ambulance wagon, a portion of which can be screened off to form a small dark room. (The French have found the plan of having the engine of the motor transport drive the dynamo which generates the electricity, very unsatisfactory, as have also some of the British workers to whom the writer has spoken, but we have learned that recently the French have again taken up the production of roentgen ray mobile units of an improved pattern, in which the dynamo is mounted on the forward part of the chassis which is extended in a very unusual form in front of the engine, the dynamo occupying a position in the line of the crankshaft, in front of the engine of the car.

We cannot refrain from making one serious criticism of the work before us. The frontispiece shows a roentgenogram of the thorax "showing early tuberculosis of the lungs." Our curiosity is great as to the points in this plate which enable the author to make the diagnosis from this single plate. No reference is made to a study of the case having been made with stereoscopic plates, without which we should hesitate to make a diagnosis of early tuberculosis in this case by roentgen ray means alone. Whether or not the author is right we do not attempt to say. We do feel that it is dangerous doctrine to print such a plate with such a diagnosis and with no more explanation than is afforded in the brief paragraph beneath it.

J. T. C.